

PRESERVATION ASSESSMENT OF THE CHRIST CHURCH CEMETERY, GREENVILLE, S.C.



Chicora Research Contribution 499

PRESERVATION ASSESSMENT OF THE CHRIST CHURCH CEMETERY, GREENVILLE, S.C.

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MANAGEMENT SUMMARY

This study examines the churchyard of Christ Episcopal Church in downtown Greenville, SC, paying special attention to the historic core around the church. Although the cemetery is still in use, the historic section should be recognized as fundamentally different from other church properties.

- ❖ It is a sacred site – consecrated within are the remains of loved ones deserving of the utmost of care and respect.
- ❖ It is an artistic site, such as sculpture gardens or outdoor museums, representing a permanent collection of three-dimensional artifacts requiring the same level of care that museums provide.
- ❖ It is an archives – a storehouse of genealogical information, representing our individual and collective pasts.
- ❖ And it is a scenic landscape – like parks or open spaces, but requiring far more focused and specific care.

In sum, cemeteries are social, historic, architectural, and archaeological artifacts. When there is little else physically remaining of a community's earliest history, the local cemetery provides a unique tie to the past that would otherwise be lost. That is one reason that the Christ Church cemetery was included in the National Register of Historic Places nomination for the church. Greenville is fortunate to have the Christ Church cemetery, but it does require very special attention.

Most notably, historic cemeteries require caregivers to devote careful attention to the Secretary of the Interior's Standards for Preservation. These guidelines should be adopted by the caregivers at Christ Church and should guide all future actions.

Over the years the historic section has received uneven care. The landscape has been inexplicably altered. Markers have been damaged through inappropriate care and management. And the cemetery has gone through episodes of limited care and maintenance. As a result of deferred or inappropriate maintenance, a number of issues – many of them critical and costly – require immediate attention.

This report evaluates these needs, classifying them into three broad categories:

- Those issues that are so critical – typically reflecting broad administrative issues, health and safety issues, and issues that if delayed will result in significantly greater costs – that require immediate attention during the immediate fiscal or calendar year.
- Those issues that, while significant and reflecting on-going deterioration and concerns, can be spread over the next 2 to 3 years. This allows some budgeting flexibility, but this flexibility should not be misconstrued as a reason to ignore the seriousness of the issues.
- Finally, those issues that represent on-going maintenance and preservation issues. These costs can be spread over

the following three to five years. Like the Second Priority issues, this budgetary flexibility should not be interpreted as allowing these issues to slide since further delay will only increase the cost of necessary actions.

Those tasks recommended for the current fiscal or calendar year have an estimated cost of \$43,150, although many actions involve managerial or administrative issues that have no appreciable cost.

Three of the major first year costs involve conservation issues. We recommend that the cemetery receive a stone-by-stone assessment, so the church can budget the funds necessary to repair significant monuments. This cost is estimated to be \$8,000.

The family tomb in the cemetery has been improperly sealed and this has resulted in moisture being trapped in the masonry. This coating is now failing, resulting in additional damage. We recommend that the coating be removed and the tomb's stucco be repaired using historically appropriate materials. The cost of this work will be approximately \$15,000.

The columbarium is suffering from active bronze disease - the deterioration or corrosion of the bronze. In addition, many covers are improperly mounted. Much of the masonry is being affected by salt deposits. Cleaning and coating of the bronze will cost an estimated \$12,000.

Since we understand that the church has insurance to cover the cost of repairing the current vandalism damage, this conservation cost is not included in our budget estimates. However, we include treatment proposals for each of the damaged monuments thought to be attributed to the vandalism. The cost of this work is \$20,125. This figure does not include travel, per diem, or lodging since these costs depend on whether one or all 20 stones are treated during one phase. Under one phase of

treatment, these associated costs would bring the treatment estimate to \$26,035.

Some treatments have been attempted by the church; these attempted treatments are not appropriate for the damage involved and fail to adequately safeguard either the public or the stone. This exposes the church to considerable liability from failed repairs. With the exception of two or three simple resettings, all of the treatments require a trained stone conservator and repairs should not be attempted by untrained individuals.

The recommendations for the second phase of critical actions, to be undertaken over the next 2-3 years, have an estimated cost of \$112,800. Although this is a significant sum, spreading the cost over three years reduces it to a manageable \$37,600 per year.

Significant second phase costs include approximately \$60,000 for the repair and maintenance of the cemetery roads, which are at least a decade old. An additional \$15,000 should be budgeted for the inspection and pruning of the cemetery's trees, which are a vital part of its landscape.

An additional \$8,000 is suggested for the rehabilitation of the cemetery's shrubbery, which has been neglected and requires extensive pruning and replacement. Like the trees, the shrubbery is a significant component of the historic landscape and must be maintained.

We also recommend that approximately \$10,000 be devoted to the maintenance of the cemetery's ironwork. This will include, minimally, the cleaning and painting of the fences in the cemetery.

The third phase of work, which can be spread over 3 to 5 years, has a cost of \$114,500.

The most significant expense in this phase of work is the rehabilitation of the turf - much of which is weed infested, compacted, and

MANAGEMENT SUMMARY

in poor health. While it is likely that conditions will improve with focused landscape maintenance activities, it is likely that given the deferred maintenance, approximately \$50,000 will be required to make turf improvements.

We recommend approximately \$35,000 be devoted to the creation of a detailed plan of the cemetery, to include individual monuments and other landscape features.

Although the task sounds daunting, Christ Church is an extremely important historic resource and deserves no less. By adopting a detailed plan of action and setting clearly defined goals, it will be possible to ensure that the work necessary can be accomplished in a reasonable period of time.

CHRIST CHURCH CEMETERY, GREENVILLE, S.C.

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INTRODUCTION

The Project

In late June 2008 Christ Church in Greenville, South Carolina contacted Chicora Foundation and requested a preservation assessment for the cemetery (or churchyard). We have conducted work at the church in the past, examining new areas to be opened for burials. Recently the church cemetery sustained vandalism and James Scott, then Director of Operations, sought an overview of the cemetery's current condition and long-term needs.



Figure 1. A portion of the Christ Church churchyard situated to the rear (east) of the church, looking south.

In discussions with Mr. Scott we determined that this initial effort would not include a stone-by-stone assessment, but would include a reconnaissance examination of the broad conservation issues and needs exhibited by the cemetery. Mr. Scott also explained that with the cemetery posed to change its landscape maintenance operations – and considering the possibility of undertaking the work in-house – it was a good opportunity to better understand

current conditions and how these operations should be undertaken to minimize harm to the historic features of the property.

A proposal addressing each of these tasks was submitted to the church and was approved by July 2. The assessment was conducted by Michael Trinkley and Debi Hacker of Chicora Foundation on July 16, 2008.

During that assessment we met extensively with Mr. Scott, who was preparing to retire. We also met briefly with Mr. Avery Currie, the new Director of Facilities. Mr. Currie would be assuming overall responsibility for maintenance in the cemetery. This report provides the results of that assessment, as well as our recommendations concerning long-term preservation efforts.

Preservation Fundamentals

Preservation is not an especially difficult concept to grasp, although the key principles are not always clearly articulated. The fundamental concepts are well presented in the Secretary of the Interior's Standards for Preservation (see Table 1).

This document reminds caregivers – at least at a general level – of what they need to be thinking about as we begin a cemetery preservation plan. Those responsible for the care of Christ Church's cemetery should be intimately familiar with the eight critical issues it outlines.

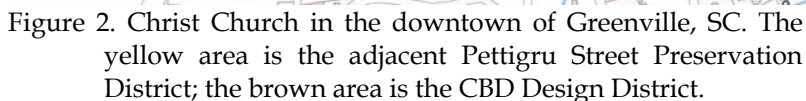
For example, all other factors being equal, a cemetery should be used as a cemetery – not to walk dogs, not as a play ground, and

Whatever conservation efforts are necessary must be done to the highest professional standards; these conservation efforts must be physically and visually compatible with the original materials; these conservation efforts must not seek to mislead the public into thinking that repairs are original work; and the conservation efforts must be documented for future generations. If an agency doesn't have a conservator or if the caregivers aren't conservators, it is their responsibility as the stewards of the property to retain a conservator appropriately trained and subscribing to the Code of Ethics and Standards of Practice of the American Institute for Conservation (AIC).

The Secretary of the Interior reminds caregivers that every cemetery has evolved and represents different styles and forms. It is their responsibility to care for all of these modifications and not seek to

create a “Disney-land” version of the cemetery, tearing out features that don’t fit into our concept of what the cemetery “ought” to look like.

Likewise, they are reminded that there will be designs, monuments, and other features



Caregivers must work diligently to understand – and retain – the historic character of the cemetery. In other words, they must look at the cemetery with a new vision and ask themselves, “what gives this cemetery its unique, historical character?” Perhaps it is the

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Table 1.
Secretary of the Interior's Standards for Preservation

1. A property will be used as it was historically, or be given a new use that maximizes the retention of distinctive materials, features, spaces, and spatial relationships. Where a treatment and use have not been identified, a property will be protected and, if necessary, stabilized until additional work may be undertaken.
2. The historic character of a property will be retained and preserved. The replacement of intact or repairable historic materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place, and use. Work needed to stabilize, consolidate, and conserve existing historic materials and features will be physically and visually compatible, identifiable upon close inspection, and properly documented for future research.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. The existing condition of historic features will be evaluated to determine the appropriate level of intervention needed. Where the severity of deterioration requires repair or limited replacement of a distinctive feature, the new material will match the old in composition, design, color, and texture.
7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.

that characterize the cemetery – and they are responsible for identifying these items and ensuring their preservation. Caregivers must be circumspect in any modifications, ensuring that they are not destroying what they seek to protect.

Before acting, they are required as good and careful stewards to explore and evaluate the property, determining exactly what level of

intervention – what level of conservation – what level of tree pruning – is actually necessary. And where it is necessary to introduce new materials – perhaps a pathway – into the cemetery, the responsible parties must do their best to make certain these new elements are not only absolutely necessary, but also match the old elements in composition, design, color, and texture. In other words, if the cemetery has brick pathways, they would be failing as good stewards if they allowed concrete pathways – especially if the only justification was because concrete was less expensive.

Where conservation treatments are necessary, the Secretary of the Interior tells caregivers that they must be the gentlest possible. However explained – less is more – think smart, not strong – caregivers have an obligation to make certain that no harm comes to the resource while under their care. And again, one of the easiest ways to comply is to make certain that caregivers retain a conservator subscribing to the ethics and standards of the American Institute for Conservation.

Finally, those responsible must also recognize that the cemetery is not just a collection of monuments and the associated landscape – the cemetery is also an archaeological resource. Caregivers must be constantly thinking about how their efforts – whether to repair a monument, put in a parking lot, or resurface a path – will affect the

archaeological resources – archaeological resources that just happen to be the remains of people buried at the cemetery by their loved ones.

These are of special concern since both the church and the churchyard/cemetery are listed on the National Register of Historic Places. This recognition of the significance of the churchyard requires that the caregivers are especially careful regarding the maintenance and operation of the site.

The Cemetery Location

Christ Church is situated in downtown Greenville, South Carolina and encompasses much of the lot situated between E North Street, Broadus Avenue, E Washington Street, and N Church Street. The property includes Greenville County TMS 0044000200300 and 0044000201401. The area is zoned OD – Office and Institutional, while the downtown area to the west is C-4 (Central Business District). The church and cemetery are situated in City Council District 3.

The EPA Enviromapper reveals that there are four nearby small quantity hazardous waste generators, although none are likely to directly impact the cemetery. Nevertheless, this urban setting presents a variety of challenges discussed in greater detail in the following sections.

The Setting and Context

The church and its cemetery abut the Pettigru Street Preservation District to the east. The 88 structures comprising this district are

primarily of frame and brick construction, dating from about 1910 to 1930. Unfortunately, its proximity to the downtown area encourages commercial encroachment and today the district is about half residential and half commercial. The portion of the district along Broadus Avenue reflects this encroachment – none of the structures are residential.

To the west of the churchyard is the central business district, while to the north the cemetery is bounded by E North Street – also SC 183 and the access route for I-385. One-way



Figure 3. The sharp curve at E North Street and failure to enforce appropriate speed limits have resulted in several collisions with the cemetery fence.

traffic exits the city using this route, increasing speed in anticipation of I-385. This has resulted in several recent collisions with the cemetery fence, which was still down as a result of one such incident several months before our assessment (Figure 3). Only two blocks to the north is the Bi-Lo Center, a major downtown arts facility and a significant traffic generator.

While the cemetery itself is an island of park-like greenery in the urban center, there is little to buffer the cemetery from the city's influences. The views are today dominated by towering office buildings and modern life. While this creates an interesting juxtaposition,

INTRODUCTION



Figure 4. Accessing the cemetery is difficult because of heavy traffic on N Church Street and the proximity of the entrances to the intersection with E North Street.

The topography of the cemetery is relatively level, although the ground does slope from an elevation of about 992 feet in the northeast to 974 feet along its southern edge (Figure 5). This is part of Greenville's overall slope southward, toward the Reedy River. Nevertheless, the cemetery is about 2,500 feet from the 500 year flood zone.

The elevation difference, however, is so slight that it has a limited impact on the cemetery and its landscape character. Most notably, when standing in the new sections at the southeastern edge of the cemetery, there is a distinct rise to the church – and the oldest sections of the graveyard.

many would find the city and its buildings visually intrusive and not conducive to the quiet and tranquility befitting a historic cemetery.

Traffic is equally heavy on N. Church Street (which is also US29, a major area highway which joins with I-185), especially during rush hours, and this makes accessing the cemetery through its main entrances very difficult (Figure 4). The oldest sections of the cemetery, situated closest to the church, are at the same elevation as the nearby streets – so there is little reduction in either the noise or visual intrusion of traffic. Efforts have been made to use vegetative screenings and this effort is at least partially effective.

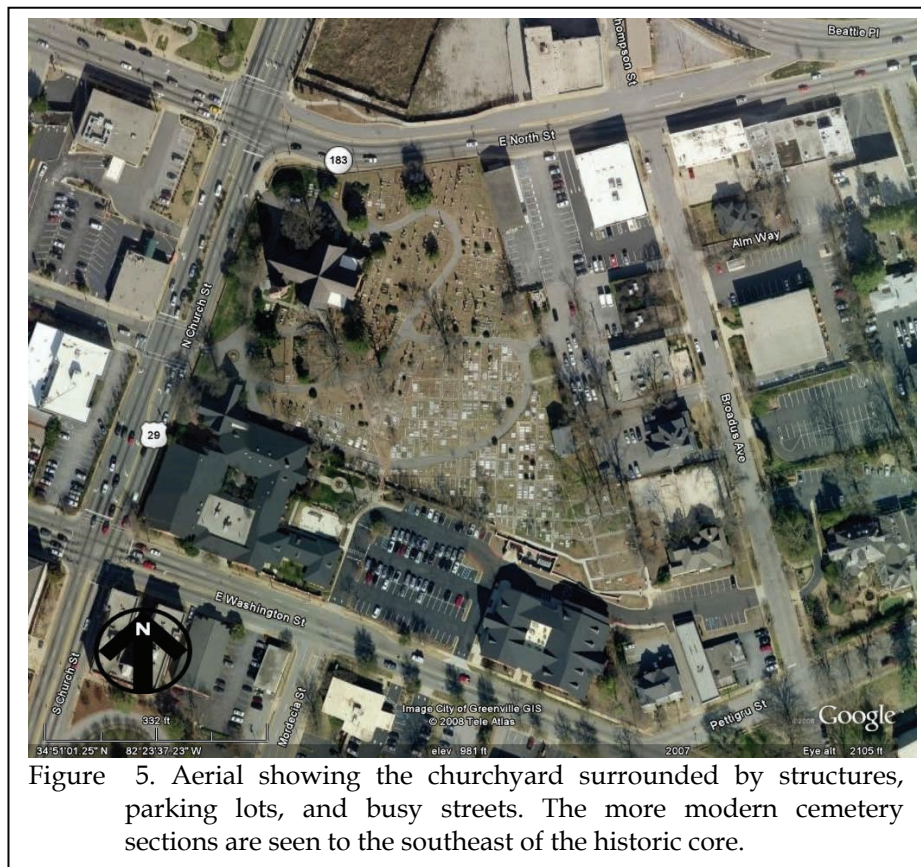


Figure 5. Aerial showing the churchyard surrounded by structures, parking lots, and busy streets. The more modern cemetery sections are seen to the southeast of the historic core.

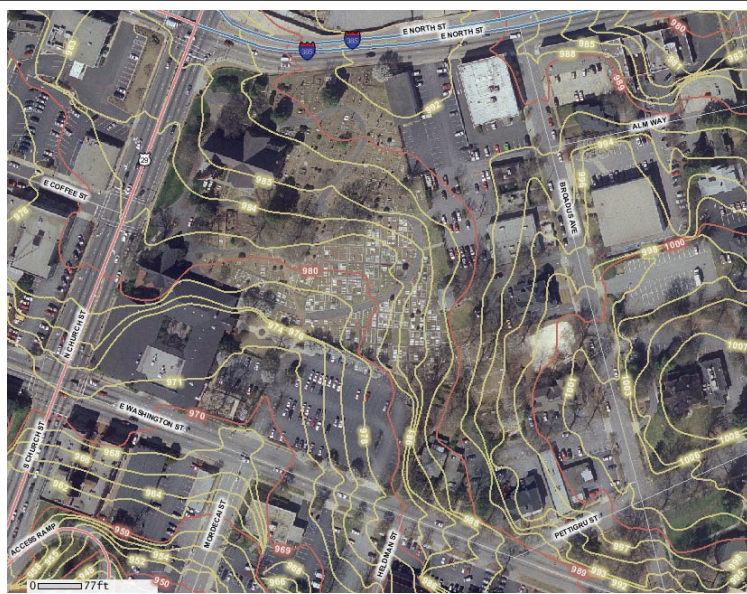


Figure 6. Topographic map of the churchyard.

The character is better defined by the three-dimensional monuments that encircle the church, comprising Sections I – V. Monuments include a variety of obelisks, cradle or bedstead monuments, and box tombs, as well as less ornate die on base stones. Family plots may be marked with curbing and ironwork still remains in several areas. One family tomb is present. It is also in these areas that the bulk of the cemetery's large trees are found. Also present are a small number of hedges and shrubs that have likely been added by families. Thus, this area tends to be shaded and more characteristic of the traditional churchyard. There is, however, no unifying plan. The vegetation gives the cemetery diversity and a range of texture that is inviting, helping to soften the harshness of the surrounding urban setting. Grave orientations in Sections I and II conform to the orientation of the church itself (and to N Church Street). Landscape dividers are limited to plot curbs, a few fences, and the winding drives.

Although portions of the churchyard contain single monuments and tightly arranged graves, much of this older section also reveals the strong influence of the Rural Cemetery movement. There was a focus on family lots –

places where extended families could be buried together for perpetuity. These lots tended to be lavish, being edged with stone, fences, and hedges. The best example of this cemetery design – and certainly most widely known – is Mount Auburn in Cambridge, Massachusetts, established in 1831. More local examples, however, include Magnolia Cemetery in Charleston (1850), Oakland Cemetery in Atlanta (1850), and Hollywood Cemetery in Richmond (1847).

Although the Rural Cemetery movement helped relieve the fear of contagion in the cities by moving the cemetery from the city core to the edge and promoted the

involvement of the lot owner, a reaction gradually grew to the ostentatious displays found in these cemeteries. One of the most outspoken critics, Adolph Strauch, the Superintendent of Spring Grove Cemetery in Cincinnati, observed that, "gaudiness is often mistaken for splendor, and capricious strangeness for improvement" (Strauch 1869:9). Strauch is credited with devising the "landscape lawn plan," often called more simply "lawn parks." The landscape was opened, made simpler and more spacious. Management limited marker size, placement, and plantings, preventing "gaudy" or "ostentatious" monuments from "cluttering" the landscape with "excess." Copings and fences were banned and, where present, were often removed.

By 1917 the "memorial park" movement had begun with the reworking of the failing Forest Park Cemetery in Los Angeles. The landscape was even further simplified, with only flush-to-ground markers allowed and all lot plantings, copings, fencing, and amenities entirely forbidden. The entire landscape was designed to minimize maintenance and, in addition, to remove vestiges of death.



Figure 7. View from the older section southward, showing the newer section that more closely resembles a memorial park cemetery. At the far edge of the cemetery is the columbarium wall.

The newer sections of Christ Church (such as Sections V and VI) exhibit characteristics of these changes in cemetery design. The newer sections have little vegetation, are more open with a memorial park appearance. The newest addition has been the columbarium wall along the south edge. Although introduced as early as the late nineteenth century, columbaria did not receive much attention until the 1930s, and it wasn't until the 1980s that they were integrated into Arlington National Cemetery (Prothero 2001:116-118).

Thus, Christ Church – like most historic cemeteries – evidences an evolution of several different cemetery designs. Although many preservation actions will be the same throughout the cemetery, some specifics of maintenance do need to be designed for the specific section, its vegetation, and its monuments.

Factors Affecting the Landscape Character

The City of Greenville is situated in the Upper Piedmont, an area more rolling and hilly than the Blue Ridge in the furthest northern reaches of the county. Most of the

rocks of the Piedmont are gneiss and schist, with some marble and quartzite. Rivers and creeks form a well-defined drainage pattern flowing primarily southeastward.

Soils in the Greenville uplands belong to one of three major associations: the Cecil-Hiawassee-Appling, the Cecil-Pacolet, and the Cecil-urban land-Hiawassee association. Formed in material which weathered from the underlying bedrock, all have loamy surface layers and clayey subsoils. All are also prone to significant erosion, are acidic in nature, and generally low in fertility (Camp 1975).

Greenville is characterized by a temperate climate with mild winters and warm summers, at least by modern standards. Winter temperatures, however, frequently hover between the low 50s and freezing, while in the summer temperatures will frequently be in the upper 80s to mid-90s. During the fall, winter, and spring the weather is controlled largely by the west to east motion of fronts and air masses. Air exchanges are less frequent in the summer and maritime tropical air can persist in the region for relatively long periods – giving rise to

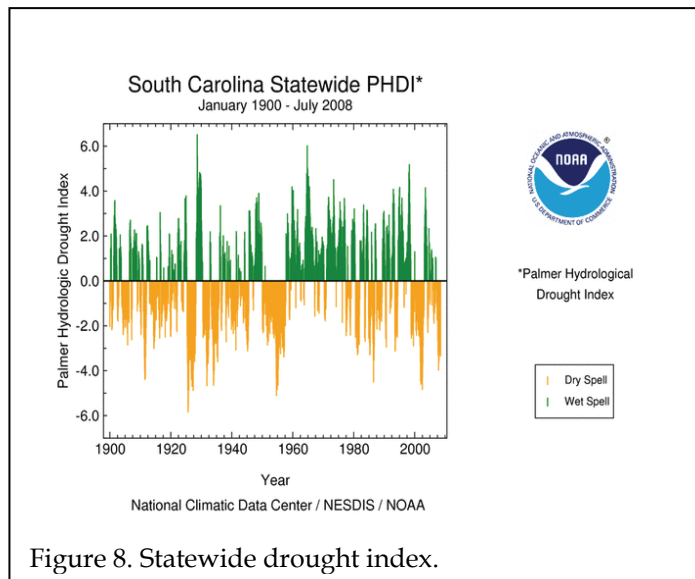
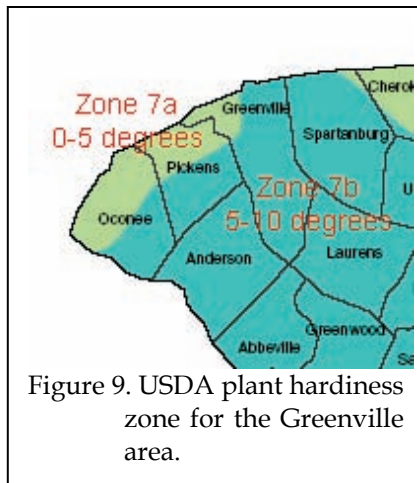


Figure 8. Statewide drought index.

very warm, humid days.

Typically abundant precipitation is distributed fairly evenly throughout the year, with an average annual precipitation of about 49 inches. Figure 8, however, reveals considerable potential for drought, with the recent trend toward significant periods of drought. The Palmer Index (Figure 8) reveals figures of -4 to -5. The Regional Drought Monitor indicates that Greenville is currently in an “Exceptional Drought” or D4. The impacts are defined as, “exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies.”



Although this is defined as the worst drought conditions, Greenville still has only voluntary restrictions in water use and no limitations on landscape use.

The area has an average growing season of about 228 days, although this will vary by specific location, with low areas often evidencing late frosts. Figure 9 shows that the bulk of Greenville County, including Christ Church Cemetery, is situated in Plant Hardiness Zone 7b, where the minimum temperatures are expected to be between 5 and 10°F.

Recommendations

All decisions regarding modifications, alterations, additions, or other actions affecting

Christ Church Cemetery should be carefully evaluated against the Secretary of the Interior's Standards for Preservation.

The historic fabric and context – especially of the older sections (sections I-IV) should be protected. No modifications should be allowed in this area since it affects the cemetery's historic core.

Much of the cemetery's character derives from the evidence of three primary cemetery designs – traditional churchyard, rural cemetery, and lawn park. These elements have particular importance and should be closely guarded.

HISTORIC SYNOPSIS

This assessment was not tasked with conducting additional research, so this account relies on primarily secondary sources to help establish a context for the cemetery. The brief discussions will also suggest areas that can be profitably researched in the future – an especially important goal since there is no comprehensive history of the cemetery.

Christ Church began in 1820, with four acres at the corner of Church and North streets donated in 1825. By 1826 a small building was present, measuring 55 by 30 feet (Huff 1995:101). Barrillon's 1830 *Plan of the Village of Greenville*, shows this original church situated at the head of Coffee Street, in an area that today is at the entrance to the cemetery. By 1845 efforts were underway to design and construct a new church with the new Gothic design eventually consecrated in 1854 (Huff 1995:122). The materials of the original church building were reportedly incorporated into the new foundation. At the same time an annex to the south was constructed (Jones 1934; Building Conservation Technology 1981: 22).

Perhaps the earliest grave in the cemetery is that of Emily Virginia Beattie, who died in 1814 (Whitmire 1976:20:6). This early date may suggest the area was already being used for burials, or it may simply indicate that the remains were moved to the cemetery once begun. Nearby Springwood Cemetery, the public burial grounds for the city, was not formally begun until 1829 when an acre was deeded to the City Commission of Streets and Markets. Even at Springwood, however, it

appears that at least one burial may have taken place as early as 1812 (Trinkley and Hacker 2006:11).

Other early graves include that of Sarah Crittenden who died in 1833, Hannah Turpin, buried in 1837, and those of Floride and Lydia Croft, who were buried in 1840 and 1842 (Whitmire 1976:20:13, 20:14, 20:51). These graves certainly indicate that a graveyard was present by the time of the initial church building. Most

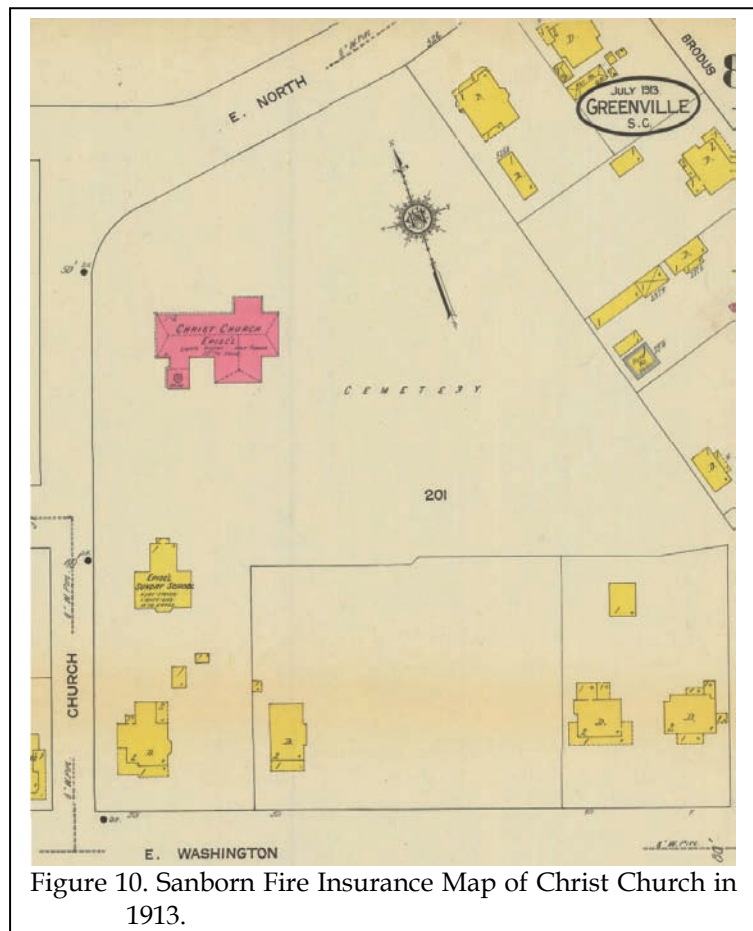


Figure 10. Sanborn Fire Insurance Map of Christ Church in 1913.

graves, however, post-date 1850, suggesting that it wasn't until the completion of the second church on the property that the congregation

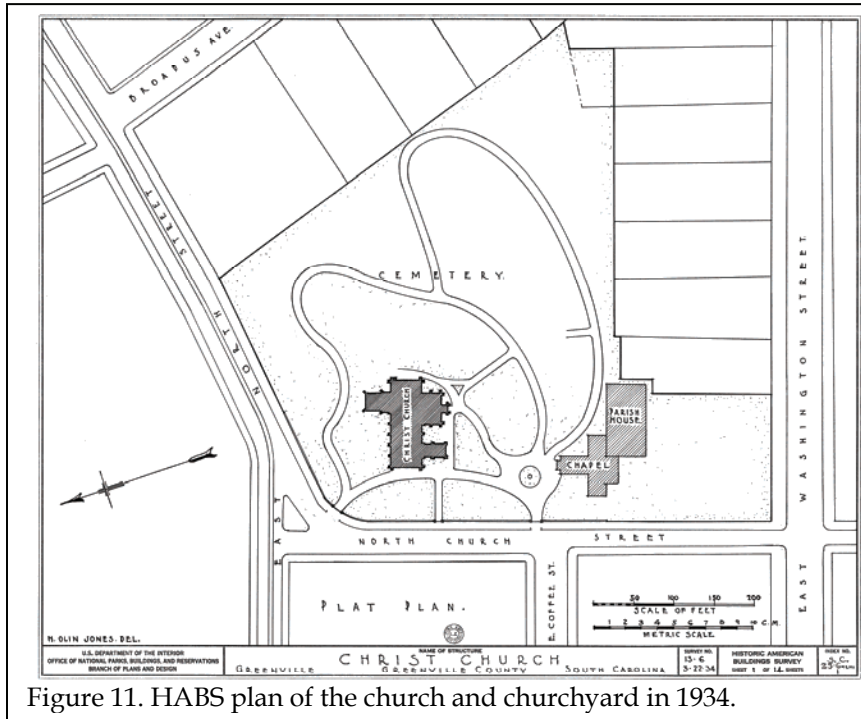


Figure 11. HABS plan of the church and churchyard in 1934.

was large enough to begin any sort of extensive use of the churchyard.

By the turn of the century the Annex was still present, identified as the Sunday school. Further to the south, at the northeast corner of Church and Washington streets, was the parsonage (Sanborn Fire Insurance Map, 1902, Sheet 10). These structures remain essentially unaltered to 1913 (Sanborn Fire Insurance Map, 1913, Sheet 8). By 1920 we find

that the Sunday school had an addition constructed to its southeast corner. Otherwise the churchyard appears unaltered and all of the surrounding lots are dwellings.

In 1934 the Historic American Building Survey (HABS) recorded the church, noting that the parsonage was no longer standing and the Sunday school (identified as a chapel) had been altered with the addition of a large “praise house” (Figure 11). The platted drives are not dramatically different from those found today.

The accompanying photograph shows the rear of the church prior to the most recent additions in 1968 (extension of the east sanctuary wall, addition of the north transept, construction of a Galilee porch at the northwest corner, and excavation of an undercroft beneath the entire church).

Figure 12 compares this 1934 photograph with a more recent photo, revealing changes in the churchyard itself.

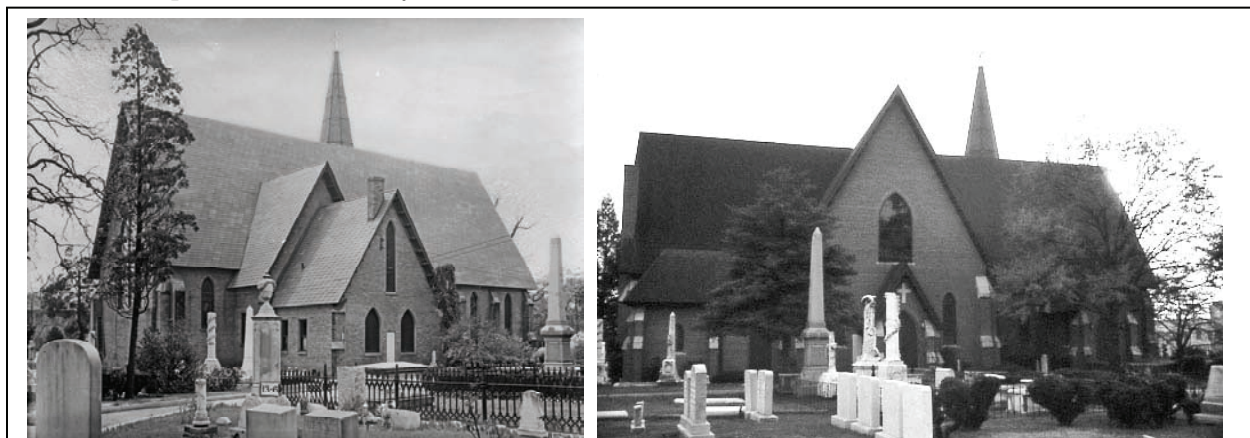


Figure 12. Two views of the churchyard. To the left is the HABS photo from 1934. To the right is the photo accompanying the National Register nomination in 1972.



In 1971 the church and churchyard – totaling approximately 7.36 acres – was placed on the National Register of Historic Places.

No digital map exists showing the entire cemetery. Figure 13, however, provides a good approximation, revealing the roads, vegetation, and plot arrangements.

Recommendations

Understandably the existing histories of Christ Church have focused on the structure and the parish. What is needed is a careful analysis of the history of cemetery itself, tracing its formation and evolution, looking at where early burials are located, documenting the

effects on the cemetery caused by various building expansions, and documenting the evolution of the various cemetery designs present.

The local newspapers likely provide a rich resource concerning activities at the cemetery. These have not been adequately exploited and an effort is necessary to scan the papers for pertinent information.

It would be useful to have an accurate survey of the cemetery and its various plots; until then the detailed aerial photography may help trace the use of the various sections.

ROAD AND PEDESTRIAN ISSUES

Circulation

The cemetery may be accessed by three gates – two on N Church Street and one off a parking lot on Broadus Avenue.

The two on N Church Street may be considered the formal or main entrances and columns mark each entrance (see Figure 4 for the northern entrance). The third entrance, off the Broadus Avenue parking lot is similarly gated and identified for handicapped use.

None of these entrances are clearly identified as associated with the cemetery. The easier to access southern Church Street entrance enters onto the courtyard and fountain, so the cemetery is not initially clearly associated with the entrance. Both of the Church Street entrances, depending on the time of day, can be difficult to access because of traffic. The Broadus Avenue entrance would likely be unknown to a casual visitor. Its access off a parking lot is unattractive and gives the appearance of a service entrance.

Once in the cemetery the roadways are all one-way drives about 10 feet in width. Areas to pull-off and park for grave visitation do not exist. The only parking is in the immediate vicinity of the fountain, parish hall, and along the north side of the church.

The roadway design is typical of rural and lawn park cemeteries, consisting of gently winding roads. One loop encircles the church, creating Sections I and II. A small loop runs off this, creating Section IV. A third loop, running off the first, provides access to the newer sections to the southeast.

Although the road design is antiquated, lacking adequate room for modern vehicles and appropriate parking, there is relatively little that can be done to improve the cemetery's circulation pattern. Graves are found to the road edges and even moderating some of the sharper turns would require relocation of plots. In general, however, traffic is light, and burials are relatively infrequent. We imagine that visitation peaks around major holidays and for these short periods there may be some circulation issues.

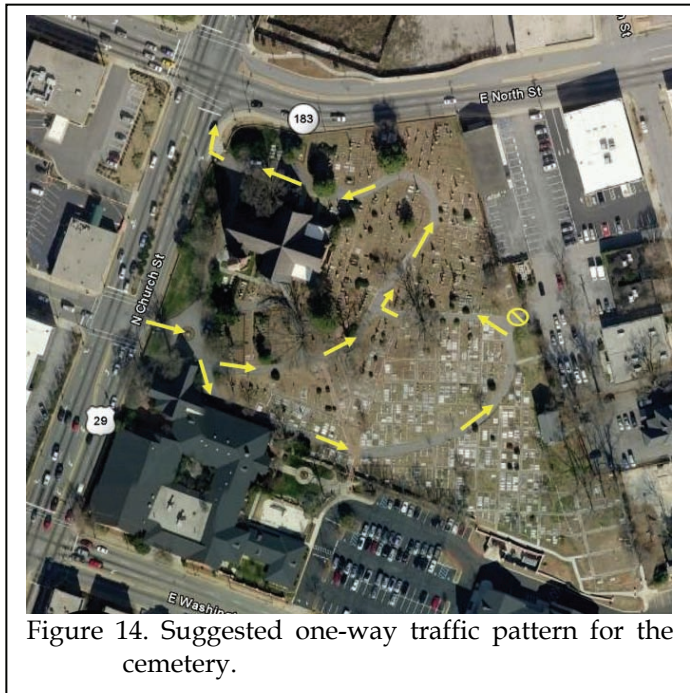


Figure 14. Suggested one-way traffic pattern for the cemetery.

It may be of assistance to clearly mark roadways for one-way traffic, using the southern Church Street as an entrance and the northern gate for exiting traffic (Figure 14).

We are inclined to suggest that the rear gate be closed. Circulating visitors through a parking lot can pose some significant hazards

and liabilities and this entrance seems to offer little to the traffic flow.

The Roadways and Curbs



Figure 15.Examples of the road deterioration in the cemetery.

The cemetery's roadways, calculated at about 1,800 linear feet, are entirely asphalt with concrete curbs in most (although not all) areas. The average life of asphalt roads in the Carolinas is 7 to 10 years.

On a scale of 1 (limited raveling) to 6 (complete failure), the Christ Church roads are at level 4 - minor "alligator" cracking over less than 35% of total area. The roads exhibit transverse, block and alligator cracking (Figure 15). Cracks such as these allow water to get into the roadway base and subgrade, resulting in pavement breakup and potholes. Causes may include fatigue or age embrittlement, among others. The roads also evidence the very initial stages of edge cracks with pavement edge breakup. Eventually these areas will involve the loss of base material.

While we recognize that the Christ Church roads receive relatively little traffic, ignoring the roads will lead to additional damage and additional repair costs. The road conditions also detract from the setting of the

historic landscape.

While limiting parking to handicapped is effective for church services, some consideration should be given to allowing short-term parking for ambulatory cemetery visitors - individuals wishing to visit graves or place flowers. This may help minimize the congestion caused by stopping in the roadways. It would, however, be necessary to educate visitors since many will want to maintain the convenience of stopping near gravesites.

The repair options should be discussed with a geotechnical engineer or road contractor. It may be possible that the existing roadways can be cracksealed in order to gain an additional few years before more expensive rehabilitation of replacement will be necessary.

Rather than obtain the lowest possible bid to "repair" or "resurface" the roads, we

recommend that the cemetery consult with a geotechnical engineer and obtain detailed specifications for the work. The cemetery should also be aware that asphalt prices are up 25.9% from a year ago and are unlikely to decline anytime soon. Thus, any additional delays in resolving the road problems will simply increase the cost to the church.



Figure 16. Example of deteriorated curb that requires replacement.

The concrete curbs are generally in acceptable condition, although we did observe several areas of extensive deterioration (Figure 16). These problem areas need to be cut out and replaced. It is critical that replacements match the original, historic curbing in composition, design, color, and texture. It is also important that the original curb profile be matched (at least two profiles are present in the cemetery). Companies such as Dee Concrete Accessories produce profiling tools to match precise

customer specifications – so the curbing can be exactly replicated.

In a few areas there are brick curbs or monument curbs. The brick curbing is nearly flush with the existing asphalt and road work may necessitate that this brick is replaced. Special care should be taken to prevent damage to monument curbing during any road work.

Pedestrian Access and Sidewalks

In addition to the three vehicular gates, the cemetery has two pedestrian gates – one into the parking lots along Broadus Avenue (Figure 17) and another into the parking lot associated with the church buildings on Washington Street. These gates seem primarily located for the convenience of church employees, maintenance, and parishioners. Neither provide especially visible or attractive access points for the visiting public.



Figure 17. Eastern pedestrian entrance off a Broadus Avenue parking lot.

Once in the cemetery there are pathways, although there are no sidewalks along the roadways. This, however, does not appear to be a significant issue since there is very little pedestrian or vehicular activity in the cemetery.

Sidewalks or Pathways within the Sections

Sidewalks or pathways within the sections consist primarily of concrete, although



Figure 18. Pathway issues at Christ Church cemetery. Upper left, deteriorating concrete; upper right, loose slate tile; lower left, sinking concrete and trip hazard; lower right, concrete uplift from roots, reduced walkway width, and steep slope.

laid brick and slate are also present in different areas. The condition of the walkways varies significantly – many are in good condition, others require immediate attention because of the liability they pose.

Concrete is the most common material at Christ Church. In several instances sections of concrete have sunk or been displaced, creating a significant trip hazard. In one area the concrete pathway is very steep and intruded upon by tree roots. Relocation of this walk (and a reduction of the slope) is the best option for both

the health of the tree and pedestrian safety. The brick paths are generally in good condition, but care should be taken in their use since they tend to be slippery when wet. They also require periodic inspection to ensure that brick are not being lifted by roots. We also observed at least one loose slate tile. Slate must also be carefully used in a cemetery context to prevent visitors from mistaking it for “discarded” stones converted into a pathway.

All of these problems not only affect the visual appearance or aesthetics of the cemetery,

but also pose a significant hazard to pedestrians and elderly cemetery visitors. As a consequence, these repairs should be given a very high priority. The crews should be especially careful to match the historic, weathered concrete texture to minimize the new work appearing different. As previously mentioned it is equally important that the concrete color match the existing Christ Church concrete.

Universal Access

The ADA or the Rehabilitation Act of 1973 is generally not interpreted to apply to cemeteries by the Department of Justice. Nevertheless, we are an aging population and cemetery visitors routinely include the elderly (by 2030 1 in 5 Americans will be 65 or older) and handicapped (approximately 20% of all Americans have a disability). Thus, all cemeteries should consider accessibility in making modifications.

Overall, Christ Church cemetery is relatively accessible. Pathways, with only a few exceptions, exhibit slopes under 2%. Most are of an adequate width - a minimum of 4 feet. Significant problems are those previously discussed - primarily deteriorated, lifted, or sinking concrete.

The pathways and roads, however, provide only generalized access. The church should consider establishing a protocol that would allow staff to assist wheelchair patrons or other disabled reach specific gravesites. Some cemeteries have achieved this goal by training their staff in the correct means of assisting the disabled¹ and by providing golf carts to help ferry individuals to grave locations.

¹ Sites for establishing appropriate protocols include
<http://www.apparelyzed.com/etiquette.html>,
<http://www.afb.org/Section.asp?SectionID=36>

Drains

The cemetery does include below grade drains. The condition of these drains is uncertain. It is also unknown if the drains have a collection sump (an area between the bottom of the outgoing pipe and the bottom of the drain) to trap sediment and other debris. The few that we examined reveal collections of leaf litter and soil (Figure 19).



Figure 19. One of the cemetery drains, showing an accumulation of leaves and other debris. These should be cleaned on a yearly basis.

The cemetery should periodically clean the drains, using either vacuum or water jet equipment. In many cases, the debris in the drains can be easily removed, minimizing the need for more costly responses.

We recommend that the cemetery identify the location of all drains. This can be effectively achieved using electronic locating equipment. The condition of the pipes can also be evaluated using video inspection .

The cemetery should use “best management practices” to reduce the need for

[&TopicID=163&DocumentID=2104](#), and
<http://www.aheadweb.org/wiki/DeafEtiquette>.

future storm drain maintenance. Streets should be routinely cleaned by the landscape crew; leaves and other debris should not be swept into the drains. The drains should be protected when opening or closing nearby graves to prevent soil from being washed into the drains.

Drains should be cleaned on a yearly basis to remove soil and leaves. The cemetery should ensure that landscape maintenance crews do not blow leaves or other debris into the drains.

Recommendations

The roads within the cemetery exhibit significant deterioration and the church should budget for their repair or rehabilitation.

To improve access, the church should consider posting roads as one-way.

An effort should be made to identify short-term parking for cemetery visitors. This may be achieved by reducing the number of handicapped parking spaces. Alternatively, parking may be provided in one of the several church parking lots. In either event, the public should have adequate notice of parking availability.

The rear entrance (off Broadus Avenue) should be closed except for service traffic or for special needs.

Several curbs require repair, involving the cutting out and replacement of the curbing. This work must match the original curbing in composition, design, color, and texture. The original profile should also be duplicated.

Concrete pathways also exhibit several areas of significant deterioration. Uplifting or sinking is observed, as well as extensive cracking and failure. This work must match the original walkway in composition, design, color, and texture. Other pathways exhibit fewer problems, but should be periodically inspected.

The below ground drains in the cemetery should be mapped and their condition evaluated through video inspection. Repairs, if necessary, should be made to ensure their proper function.

LIGHTING AND SECURITY ISSUES

Cemetery Lighting

Churchyard cemeteries were historically not lit, so the introduction of lighting can be problematic. Nevertheless, lighting is often thought necessary to curb crime and vandalism.

The cemetery currently has a series of pole lamps that do blend with the landscape. Electrical service is supplied by buried lines, further reducing the intrusive affects. This lighting, we are told, comes on at dusk but is timed to go off in the early evening – it does not stay on until dawn.

In addition, the church has installed a series of large spotlights to illuminate the church. The placement of these lamps on grave plots is a serious visual intrusion and degrades the appearance of the cemetery. An effort should be made to better hide these lamps to reduce their effects.

In addition to the church lighting, the property is surrounded by a series of municipal “cobra head” light fixtures, both along N Church and E North streets, as well as along the parking lots to the east of the cemetery. These have a mixture of both underground and overhead wires; the former are found along N Church Street, while overhead wires are used in the parking area.

Vandalism

The churchyard has recently been vandalized, with 13 monuments damaged. The incident was identified within a day of its occurrence and was reported to the Greenville Police Department. The cemetery’s proximity to the Bi-Lo Center may contribute to the problem, although there has been only sporadic vandalism in the past.

We recommend that the church develop a form designed for the reporting of cemetery-specific vandalism. This form should include several items:

- ❖ What was damaged, with specific information concerning each stone, including the name and lot/plot?
- ❖ How was the stone damaged (toppled, broken into ? fragments, scratched, etc.)?



Figure 20. Example of the two types of lighting fixtures in the cemetery. In the foreground is a pole lamp with underground service. In the background is a “cobra head” lamp with overhead wiring.



Figure 21. Example of intrusive lighting that should be avoided.

- ❖ Where the stone is now (was the broken stone gathered up for storage, if so, where is it stored)?
- ❖ An estimate of when the damage occurred. This should routinely include the last time the stone was known to be undamaged.
- ❖ An estimate - from a conservator - of the extent of the damage and cost for repair.
- ❖ A photograph of the damaged stone.
- ❖ When police were notified.
- ❖ When police responded and took a report.
- ❖ The outcome of the police investigation.

It is critical that the church report each and every case of vandalism, regardless of extent, to the police. The cemetery should also work with the police to educate them concerning the historical value of these stones and the financial cost of the damage to ensure that the police take the reports seriously. If the damage is recent, the police should be expected to assign crime scene investigators to collect evidence. This evidence may include shoe prints in soil or on stones, discarded beverage containers with finger prints, collection of evidence such as cigarettes, and collection of any eye witness accounts. The police should be expected to assign an investigator and this individual should be expected to treat this as a real crime deserving of real investigatory efforts.

Sadly, we note that in spite of the church's prompt reporting of the vandalism, the Greenville Police responded by only taking a report (case 08000-42952), which was administratively closed without action. Given the extent of damage, the church should expect local law enforcement to investigate the crime.



Figure 22. "Cobra head" lamp in the area of recent vandalism.

We have several recommendations regarding vandalism.

Lighting is sometimes seen as reducing vandalism. There are two problems with this approach. The first is, as previously mentioned, that the churchyard would not have been lit historically. Thus, the introduction of lighting detracts from the historical integrity of the property, changing the historic fabric. The second problem is that lighting is only useful if there is someone guarding the property, using the lighting to identify problems. This is not the case in the churchyard.

In addition, we note that the area hardest hit by the recent vandalism would have been lit by a municipal street lamp (Figure 22) – so clearly it had little effect. We do not recommend any additional lighting.

Fencing is only somewhat successful in reducing vandalism. However, even the existing cemetery fence can offer some deterrence simply by blocking convenient access – hardening the target. It may be no coincidence that the “ground zero” of the recent vandalism was where the cemetery fence along E North Street is waiting repair.

Thus, we encourage the cemetery to replace this fence as quickly as possible. In addition, we recommend (as we have elsewhere in this study), that the rear vehicular gate be closed and locked, especially at night. In addition, these rear and side pedestrian gates should also be closed and locked.

We recommend, however, that at least one front gate be left open to facilitate police patrols (discussed below).

The visibility of staff, visitors, and the police will do far more to discourage vandalism than any other measure. We recommend that the cemetery caregivers work with local law enforcement to ensure there are routine patrols through the cemetery. A police presence can be a major deterrent to cemetery-related crimes. To facilitate this, at least one front gate should be left open, allowing patrol cars to enter the

cemetery, drive through the cemetery, and exit again. The presence of nightly police patrols is a critical element in a program to minimize future vandalism.

The church should also consider raising a friends group to drive through the cemetery on weekends and at other times – promoting a more visible presence. These citizen patrols should be especially scheduled during events at nearby venues and on typically problematic holidays (such as Halloween).

We also recommend that a caretaker ideally walk through the cemetery on a daily basis. If this can’t be achieved, the cemetery should at least be driven through. It is also important that the landscape crew be included in the efforts to identify and report any evidence of new damage.

Reported crime in the City of Greenville has declined over the past decade; however, its crime rate remains nearly double that for the US. In 2005 the national average of violent crimes was 469 per 100,000. In Greenville the rate was 705 per 100,000. Property crimes were even higher, at 6,650 per 100,000. In fact, both personal and property crimes exceed those for the state as a whole.

In 2007 the Greenville Crime Incident Mapping System shows four DUI arrests, one assault, and two larcenies within 0.5 miles of the cemetery.

Hardening Targets

Thefts in cemeteries have dramatically increased. The reasons for this are two-fold. First, there is an increasing market for gates, urns, ironwork, and statuary – created by an increase in upscale garden design and individuals willing to pay large sums for original artwork. Second, there is less attention being paid to cemetery fixtures, largely the result of decreased maintenance budgets and fewer police patrols.

Christ Church has a number of items that would be especially attractive to thieves, including fencing sections, iron gates, and statuary.



Figure 23. Gates such as these are unsecured and provide an easy target for thieves.

During this assessment we discovered that all of the fence gates on individual plots were susceptible to theft since none were secured. *It is a simple maintenance step to use woven stainless steel wire to secure gates to their hinge posts.* This allows the gate to open and close, but makes it considerably more difficult to lift the gate off its hinges and steal it (see the website <http://crm.cr.nps.gov/archive/25-02/25-2-15.pdf> for additional information). The per gate cost is less than \$20 and the time involved is about 15 minutes per gate. This is something that maintenance personnel could easily accomplish in a single day. We noted that a modern bench at the west end of the cemetery is secured in this fashion.

Even the damaged

boundary fence sections are attractive to thieves and these pieces have been stacked in close proximity to the street – making them a very attractive target. They, too, should be secured to make it more difficult for them to be quickly loaded into a truck (Figure 23).

Other objects of potential theft even include vases, and American Legion and Confederate Cross markers. Although their scrap metal value may be less than \$20, their replacement costs are often in excess of \$300.

There are several steps the church can take to minimize losses. One has already been discussed – an increased presence and periodic patrol of the cemetery will make it less attractive to thieves. The church should also inventory lots, removing or securing objects. On the newer plots, the church may wish to notify owners concerning the increase in thefts and advise owners to obtain personal insurance to cover replacement



Figure 23. Loose sections of the boundary fence should be secured together to minimize the potential for their theft.

costs of in ground vases and similar objects.

Recommendations

The church should develop a policy for identifying, reporting, and responding to damage, vandalism, and theft within the cemetery.

The church should work to ensure that there are routine police patrols through the cemetery. These should occur at least once per night, with special attention paid to weekends.

The church or a volunteer group should arrange to supplement police patrols to keep an increased eye on the cemetery.

The maintenance staff should walk through the cemetery daily to review conditions. Landscape crews should also be trained to look for evidence of theft or vandalism.

Plots should be evaluated for theft potential. Items should be secured as appropriate.

All plot gates and loose ironwork in the cemetery should be secured using woven stainless steel wire, attaching the gate to its hinge post.

CHRIST CHURCH CEMETERY, GREENVILLE, S.C

CEMETERY FIXTURES AND FURNISHINGS

Plot Fences

The churchyard contains a very nice assortment of historic ironwork. These are significant resources, characteristic of the Rural Cemetery Movement and are critical components of the cemetery landscape. Consequently, they deserve special care and attention.



Figure 24. Two examples of ironwork that require cleaning and painting. The example on the left illustrates a failed coating, while the fence on the right exhibits only bare metal.

These fences, however, have not received appropriate care and all require immediate intervention. Problems observed during the assessment include metal corrosion, damaged connectors, missing parts, and loose parts. As previously discussed, none of the gates are secured and are at risk of theft.

While repairs are needed, the primary recommendation is that the fences be painted –

this will improve their appearance and will reduce future conservation problems.

The best approach to historic ironwork is minimal wire brushing to release obvious scale and corrosion, then the use of a rust converter as a primer. Of the three that were successfully tested by the Canadian Conservation Center, Rust-Oleum's Rust Reformer is the least expensive and most readily available (it is available, for example, from Grainger's Industrial Supply for about \$80/gallon). We recommend two coats of the Rust Reformer. These can be applied over stable corrosion and the product does an excellent job of converting the corrosion into a stable base for a top coat of alkyd paint. The Rust Reformer should be thoroughly worked into all cracks, crevices, details in the ironwork.

A single coat of a good quality alkyd paint is adequate and it should not be applied thickly, as thick coats hide detail, cure poorly, and will often prematurely fail. Absent

historic documentation that suggests otherwise, flat or semi-gloss black is typically an appropriate fence color.

All painting should be by brush – no sprayers should be used since they allow drift onto nearby stones. Tarps should be used to protect vegetation and adjacent stones from brush splatter.



Figure 25. Examples of loose fence parts that should be collected and safely stored.

This maintenance program will significantly improve the appearance of the ironwork and will help prevent additional corrosion and deterioration of the various fence components.

A number of loose fence parts are found in the cemetery (Figure 25). As previously discussed, these are convenient targets for thieves; in addition, they are subject to additional damage and corrosion. They should either be neatly leaned against a stable portion of the fence and secured using stainless steel cable or they should be safely stored (with information concerning their origin) until repair is possible.

Figure 25 also shows an example of a broken corner post. Figure 26 shows a broken connector. There are many similar examples in the cemetery. We recommend that the church obtain detailed plot-by-plot assessments to determine the cost of making critical repairs. It is important to understand that welding of these fences is difficult and is not always the appropriate repair technique. In particular, cast iron is difficult to weld and repair should only be attempted by very skilled individuals. Welds must be continuous and ground smooth to prevent any areas that would allow moisture to collect. In some cases,



Figure 26. Example of a broken connector where welding is an inappropriate repair technique.

such as the damage in Figure 26, welding would be inappropriate. This was originally a slip joint that allowed expansion and contraction of the fence. If welded it would place severe strain on the fence, causing additional breakage or damage.

Mausoleums

Although mausoleums or vaults are monuments, their massive architectural scale places them in a category that should be distinguished from more modest monuments. Mausoleums suffer many of the same problems found in masonry buildings – poor foundations, settling, splaying walls, roof leaks, iron jacking, and so forth. They require constant maintenance just as any structure. They also pose a liability to their caregivers far in excess of typical monuments.

The Christ Church cemetery contains one vault, situated adjacent to E North Street at the north edge of the churchyard. This vault exhibits a variety of problems that require immediate attention.

The simplest problem to correct involves the presence of several trees to the side and rear of the structure. These overhang the mausoleum and hold moisture in the masonry. Minimally they should be pruned to heighten the canopy and remove branches from the vault. Given the number of trees in such close proximity, consideration should also be given to thinning these trees (removing all but one).

A more significant problem involves the application of an inappropriate coating to the vault in the past. A non-breathable stucco-like coating was applied, probably on the urging of a contractor who had no experience or understanding of historic masonry.

Today this coating is failing because moisture has found its way into the masonry from the inside and has no way to escape. Below this modern coating can be seen the earlier (and perhaps



Figure 27. Failing non-breathable coating that has been applied to the mausoleum. Bottom photo shows the original colored whitewash over the lime-based stucco.

original) cream colored whitewash over the original lime-based stucco (Figure 27).

Intervention will include the removal of the modern coating, repair of the underlying stucco as may be necessary, and reapplication of either a colored whitewash or the use of a



Figure 28. Columbarium showing evidence of bronze disease and salt staining.

mineral based paint, such as Silin AZ.

Failure to resolve the moisture issue with this monument will result in damage extending into the masonry units themselves – increasing repair costs. This should receive a high priority.

Columbarium

The church has constructed a brick columbarium along the south edge of the cemetery (Figure 28). Unfortunately these reveal the need for extensive maintenance. Exposed to the weather, especially high relative humidities, the bronze plaques exhibit extensive staining and corrosion. The bright green color is known as “bronze disease” – an unstable form of patina resulting from the conversion of cuprous chloride in the patina to basic cuprous chloride. This results in the formation of either hydrochloric or sulfuric acid, depending on local environmental conditions.

The white material below many of the plaques appears to be salt and is likely the result of the bronze corrosion.

There are several treatment options, although it may not be possible to obtain satisfactory results without removing the plaques to allow treatment of the interior face.

Cleaning should begin with the use of high pressure water

Another issue observed is that many of the plaques have been installed using ferrous bolts or screws. This has caused a galvanic reaction between the bronze (a noble metal or cathode) and the mild steel (an anode that will be corroded). This is a very fundamental error on the part of those responsible for the columbarium and should be corrected immediately by replacing the ferrous hardware with brass.

Careful inspection also reveals that many of the screws or bolts are missing and many do not have their appropriate decorative heads. These are also maintenance issues that should be corrected.



Figure 29. Multiple maintenance problems at the columbarium.

Conservators use several techniques to mechanically or chemically remove bronze disease and these techniques generally do not damage the underlying metal (as using an abrasive would). The brick will also need to be cleaned, probably using moderate pressure water, although a poultice may also be required.

Once the staining is removed, it will be necessary to either wax or chemically coat the plaques. Regardless of the technique used, however, bronze requires periodic maintenance. Without this ongoing (probably yearly) maintenance the columbarium will return to its current condition.

Other Lot Amenities

There are a variety of modern benches throughout the cemetery. We are ambivalent concerning bench placement in urban cemeteries since they are often misused. It is fortunate that the cemetery has not found them attractive to the homeless.



Figure 30. Cemetery bench placed in 1998 that requires replacement or maintenance.

Regardless, we observed that they are not being adequately maintained. Figure 30 shows one bench that was placed 10 years ago. The wood is deteriorated and the plaque has been vandalized. The church must realize that all items placed in a cemetery require constant

upkeep and maintenance. This bench, for example, requires yearly coating with either a water repellent or tung oil.

The church should also devise a policy on the addition of such features. While donors are frequently happy to fund the purchase, there is often no money (or time) for on-going maintenance. Further, the addition of such elements can change the historic landscape, affecting the historical integrity of the National Register property. We recommend that such additions be minimized.

Recommendations

The church should immediately implement - or fund - a maintenance program for the iron work in the cemetery. This program should consist - minimally - of cleaning and painting all of the ironwork.

Loose ironwork should be collected and either secured in the plot or cataloged and stored off-site.

Ironwork repair is very exacting and we recommend that the fences be evaluated on a plot-by-plot basis, with the development of specific treatment plans for each.

The mausoleum in the cemetery has mistakenly had an inappropriate, non-breathable coating applied. This is now causing problems as moisture attempts to escape. The coating needs to be removed. The underlying stucco should be repaired as necessary and the mausoleum should have either a colored whitewash or a mineral

based paint applied.

The columbarium evidences extensive bronze disease with salt efflorescence. We also note that hardware is missing from many covers

and on others there is incorrect hardware that is causing additional corrosion. This will require a major maintenance program and the church should plan on yearly retreatment.

There are benches throughout the cemetery that require maintenance or replacement. The church should consider the wisdom of placing benches in this urban setting. It is also important that the church devise a policy regarding such landscape additions since they affect the overall integrity of the historic site.

LANDSCAPE MAINTENANCE

For a number of years the church has contracted out the landscape maintenance in the cemetery. We understand that agreement is coming to an end and the church is weighing in-house staff with contracted service. Before offering a recommendation concerning that issue, it is important to review the current condition of the cemetery landscape. Recommendations concerning improvements will be applicable to either in-house or a contracted service.

Staffing

The current maintenance contract apparently has between 1-3 individuals working in the cemetery on a bi-weekly basis. We are told that the current contract firm is not a member of any national or state organization, such as PLANET or the S.C. Nursery & Landscape Association. Those doing the work may have little specific training.

Four issues are of critical importance: the level of staffing provided, the level of training provided, the quality of supervision, and continuity in the labor force.

Level of Staffing

We typically recommend two workers and one supervisor per 10 acres – with all three individuals working in the cemetery on a full-time basis. This is based on the Boston Historic Burying Grounds Initiative (Atwood et al. 1989) and is particularly suitable for Christ Church's situation since it is estimated that mowing old cemeteries with 3-dimensional monuments requires six-times the labor than modern lawn park cemeteries (Klupar 1962:239; Llewellyn 1998:100).

Organizations are often surprised at this level of staffing – but this surprise is grounded in the misunderstanding that cemetery maintenance is primarily “cutting the grass.”

Appropriate maintenance established by good practice includes weed control, tree trimming, pruning, seasonal cleanup, maintaining the roads, conducting section inspections, survey of monuments for maintenance needs, maintenance of shrub beds, maintaining section signs, maintaining water lines, rehabilitation of barren areas, raking, resetting stones as needed, inspecting and repairing fences, watering newly planted areas, sodding as necessary, identification of trees for removal, removal of flowers and grave decorations, removal of wild growth, and inspection and cleaning of catch basins (see, for example, Klupar 1962:226-228). The importance of maintenance was clearly stated by West, “one thing is certain, the cemetery must be maintained in a proper manner or public confidence will suffer” (West 1917:26).

This larger crew would also allow the church to train certain employees in the appropriate way to reset monuments, as well as make simple repairs. It would be possible to undertake, for example, an appropriate level of fence maintenance at the cemetery.

It is important that these employees be assigned exclusively to the maintenance of the cemetery – and not be viewed as general maintenance or janitorial staff. It is critical that cemetery staff develop a sense of ownership and continuity.

In addition to these maintenance efforts, efficient cemetery operation also depends on management activities that Llewellyn describes

as ranging from “land use (master planning), road maintenance, utility operation (backbone utilities like water), budget balancing (sales to cover expenses), long-term financial concerns, community relations, enforcement of rules and regulations, and so on” (Llewellyn 1998:206). In fact, he spends an entire chapter on administrative responsibilities of the cemetery manager.

Consequently, the church must provide a staffing level that will maintain the beauty, dignity, and historical significance of the cemetery.

Staff Training

Sadly, professional training in the landscape industry, at least among the public, is undervalued. This contributes to rapid turn-over and inappropriate maintenance activities (seen throughout Christ Church Cemetery as an undue emphasis on cutting the grass as expeditiously as possible).

While it might be ideal to employ only individuals with horticultural degrees, that is unlikely to happen. Training, nevertheless, is critical.

In 2005 the Associated Landscape Contractors of America (ALCA) and the Professional Lawn Care Association of America (PLCAA) merged to form the Professional Landcare Network (PLANET). This organization offers three certification programs that should be requirements for all of the cemetery’s technician-level staff.

The first is the Certified Landscape Technician – Exterior. The exam for this certification is a hands-on field test and candidates can be tested in Installation, Maintenance, or Irrigation. Technicians at Christ Church should be certified in Maintenance. This would establish credentials by meeting international standards for safe and effective operation of machinery and demonstrating a

thorough understanding of all facets of the position.

The second is Certified Turfgrass Professional – a comprehensive study of both warm and cool-season turfgrasses developed by the University of Georgia Center for Continuing Education. Certification in this area demonstrates a mastery of weed, insect and disease identification/control, as well as diagnosis of common turfgrass problems. The material supports Integrated Pest Management concepts and pesticide safety – significantly reducing the church’s liability for operations.

The third is Certified Ornamental Landscape Professional. This certification emphasizes tree and shrub maintenance procedures with candidates concentrating on landscape trees and ornamental woody plant physiology, health care management, and establishment.

The church should either require each applicant to already be certified – or should provide up to a year to achieve certification. Regardless, the educational level and proficiency evidenced by certification should be a requirement for the cemetery caretakers.

Yet another aspect of training involves the trees and their maintenance. Given the importance of the trees to the vista and historic landscape, and the potential damage that improper tree care can create, we recommend that the church use only International Society of Arboriculture (ISA) Certified Arborists.

Certified arborists have a minimum of three years experience in some aspect of tree care and have passed an exam developed by an international panel of experts. The exam extensively covers every aspect of tree care and the individuals must have an acceptable level of knowledge in all areas of arboriculture.

The Quality of Supervision

Regardless of the credentials or certification, the complexity of a cemetery landscape requires that the technicians are well supervised and are held accountable for their performance. It is especially important, therefore, that the supervisory position be carefully defined. The selected individuals must not only be well trained and knowledgeable, but also possess demonstrated supervisory experience. The supervisor must be expected to work alongside the crews on a daily basis. In other words, the individual must be a “hands-on” supervisor and not simply an office director or part-time manager with other duties.

Continuity of the Staff

Maintaining the continuity of a maintenance staff with a commitment to the preservation of a historic cemetery is critical. It not only serves to help ensure the highest possible quality of care, but also allows the specialized knowledge that accrues to be transferred to new staff members over time.

Obtaining this continuity, of course, demands that the church provide a reasonable pay scale for new workers and ensure that staff does not feel trapped in a dead-end job.

Cemetery Trees

Selection Issues

It appears that there is no policy or program for tree planting in the cemetery. We suspect that as trees have aged and died or otherwise been removed, there has been little effort to revegetate at least the historic core. This situation needs to be rectified through a careful tree planting program. In the future, any tree removed from the cemetery should be replaced.

Cemeteries, in general, have historically been dominated by large deciduous trees, although evergreens such as cedar are also very

common. They provide a distinctly inviting image for visitors and passersby. These trees also provide some visual separation from adjacent buildings – especially in cluttered urban environments.

Ideally the trees selected should be historically appropriate. In the case of a planned cemetery, the ideal would be to use those trees selected by the original designers – respecting their original intent and interpretation. However, in a churchyard cemetery it is likely that there was no planning and the trees are simply native species that happened to be present or that arrived naturally.

All other issues being equal – plantings should focus on those tree species that are known to have been used in cemetery contexts. While diversification may be acceptable, we urge care in selecting additional plantings, focusing on a small number of historically appropriate trees (see Table 1) to maintain the historical integrity of the cemetery.

Some trees, whether historically appropriate or not, should probably be avoided since they pose significant maintenance issues. These include trees that produce dense shade (causing problems with the turfgrass; for example, magnolia); trees that exhibit suckers or surface roots (also causing turfgrass problems, e.g., beech, honeylocust, linden, poplar, and willow); trees that drop large quantities of leaves, seeds, or sap (such as ash, black cherry, catalpa, ginko, horsechestnut, mulberry, and sweetgum); and trees that are especially weak or vulnerable to wind or ice damage (such as ash, black cherry, pine, poplar, red maple, silver maple, tuliptree, willow, and white ash).

When Table 2 is examined, it becomes clear that there is no such thing as a perfect tree. Many of the historically appropriate species have significant problems. At least some of these problems, however, can be overcome through judicious placement and appropriate planning.

Table 2.
Comparison of Historically Appropriate Trees That Might Be Used at Christ Church Cemetery

Common Name	Scientific Name	Origin	Cultivation			Size (HxS)	Litter	Breakage	Roots	Notes
			Zone	Light	Drought					
American Ash	<i>Fraxinus americana</i>	Native: 1724	3-9A	PS-FS	M	50-80x40-60	Much	Weak	Problem	Not tolerant of urban soils or heavy clay.
American Beech	<i>Fagus grandifolia</i>	Native: 1783	3-8	S-S	M	50-75x40-50	None	Resistant	Problem	Not tolerant of urban soils or heavy clay.
American Elm	<i>Ulmus americana</i>	Native: 1670	2-9	PS-FS	M	70-90x50-70	Much	Weak	Problem	Michael Dirr (1998) recommends "Valley Forge," "New Harmony," and "Princeton" as respectably disease tolerant.
American Linden	<i>Tilia americana</i>	Native: 1752	3-8	PS-FS	M	50-80x35-80	Much	Weak	No Problem	Good specimen tree; typically more formal landscape.
American Sycamore	<i>Platanus occidentalis</i>	Native: 1640	4B-9A	FS	H	75-90x50-70	Much	Resistant	Problem	Historically anthracnose has been a problem, but may be treated today with a properly labeled fungicide.
Arborvitae	<i>Thuja occidentalis</i>	Native: 1536	2-7	PS-FS	M	25-40x10-12	None	Resistant	No Problem	Good screen or hedge plant; not commonly used as a specimen plant.
Eastern Red Cedar	<i>Juniperus virginiana</i>	Native: 1664	2-9	PS-FS	H	40-50x10-20	None	Weak	No Problem	Planted for "perfect columnar growth" and traditional African American cemetery tree.
Live Oak	<i>Quercus virginiana</i>	Native: 1739	7B-10B	PS-FS	H	60-80x60-100	Much	Resistant	Problem	Raleigh is at the edge of its range; southern classic.
Red Oak	<i>Quercus rubra</i>	Native: 1783	5-8A	FS	H	60-70x50-60	Much	Weak	Problem	Not as popular as elm and maple.
Sugar Maple	<i>Acer saccharum</i>	Native: 1735	3-8A	S-FS	M	50-80x35-80	None	Resistant	No Problem	Excellent colors through all seasons; frequently used for ornamental plantings.
Tree-of-Heaven	<i>Allanhus altissima</i>	Exotic: 1784	5-8A	PS-FS	H	60-75x35-60	Much	Weak	Problem	Today viewed as pest or weed tree, but if well cared for it can be a spectacular specimen tree.
Weeping Willow	<i>Salix babylonica</i>	Exotic: 1730	2-9A	PS-FS	H	45-70x45-70	Much	Weak	Problem	Roots are especially aggressive.
White Oak	<i>Quercus alba</i>	Native: 1724	3B-8	PS-FS	M	60-100x60-80	Much	Resistant	No Problem	A northern oak; Raleigh is at the edge of its range. Was a favored tree, however.

Light: shade, part shade, part sun, full sun; Drought: moderately to highly tolerant; Size shows height x spread in feet; Roots reflect the presence of surface roots or roots that lift sidewalks. Data from USDA, Forest Service Plant Fact Sheets, Adams (2004), and Simonds (1917).

The church, using a certified arborist, should assess the health and condition of the existing trees and develop a long-range tree plan. Table 2 provides a list of ISA Certified Arborists in the Greenville area.

As mentioned earlier, trees should be replanted as older ones are removed and a general effort should be made to plan for future tree replacement, perhaps using a mix of fast-growing but short-lived trees intermixed with slow-growing but long-lived trees to create a planned appearance. It is also appropriate to plant replacement trees in anticipation of their need, allowing them an opportunity to become established before the diseased or damaged tree is removed.

Planting Issues

Locations chosen for planting should not interfere with gravestones, curbing, or fences. Issues of security should also be considered and the use of small trees that obscure eye level views should generally be limited or avoided.

We have previously mentioned that several trees are interfering with the family tomb or mausoleum in the cemetery. Figure 31 also shows a tree that is entirely too close to the church. It should be removed before it grows so large that it causes additional problems.

Research is suggesting that trees, especially older mature trees, improve in health when turfgrass is removed under the branch spread and mulch is applied at a depth not exceeding 3 to 4-inches.

We found that very few of the trees were mulched. Several that were mulched had too much. We also observed at least one tree, a magnolia, where there was no turf and the soil under the tree was hard and compacted – providing clear evidence of the need for mulch. Consideration should also be given to reducing

the compaction in this area using core aeration, radial trench mulching, or an air spade.

All newly planted trees should be of at least 1 to 2-inch caliper and meet the minimum requirements of the American Nursery and Landscape Association's American Standard for Nursery Stock (ANSI Z60.1-2004).

Of special concern is the planting technique. Often trees are planted too deeply, with the root collar being buried. This will stress, and often kill, the tree. The root collar



Figure 32. Tree that is growing too close to the church building.

(the base of the trunk and root flair) and the trunk have a different outer tissue than the roots. Roots have evolved many mechanisms to survive in continually moist environments while the trunks of most woody plants have not. Constant moisture on the bark can reduce the respiration in the bark tissue, which will slow down the sap flow for the entire tree. The moist tissue also becomes more susceptible to several serious diseases.

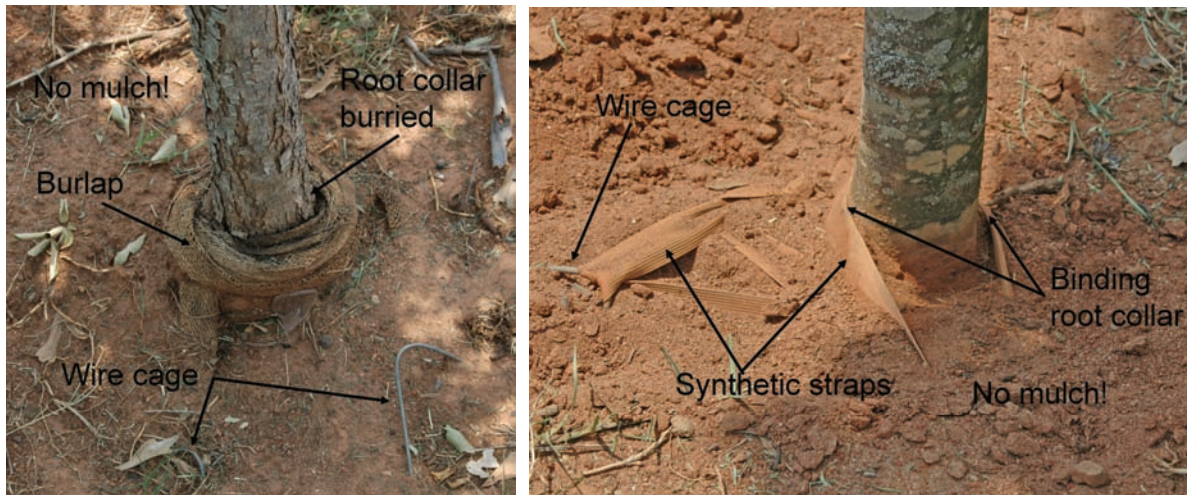


Figure 33. Planting issues. Photos reveal a variety of problems with newly planted trees in the cemetery.

Another issue we observed was that the burlap and wire cages used to hold the root ball had not been removed (Figure 32). The ISA recommends that at least the upper third to one-half of wire cages be cut away. Synthetic or treated burlap should be entirely removed and natural burlap should be folded back from the top third of the root ball.

It is clear that at least some of the trees in the cemetery have not been properly planted – suggesting that those responsible for the work were not adequately trained in this task.

We also observed that dogwoods were being planted in full sun (Figure 33). Dogwoods are typically an understory tree and they do not thrive in full sun. They are also not an especially appropriate cemetery tree.

Maintenance Issues

Maintenance involves at least four basic issues: watering, fertilization, pruning, and pest control.

The church does not, on a routine basis, water trees in the cemetery, relying instead on rainfall. While this is typically acceptable, the landscape plan should include provisions for deep-root water during periods of drought.



Figure 34. Planted in full sun, this dogwood has died back to the point that little is left. Notice the dead branches, the loss of its primary leader, and the peeling bark. The tree should be removed and replaced with an appropriate species.

Using a root feeder without fertilizer, it is possible to apply water 12 to 18-inches below the surface. This approach can not only be used

Table 3.
ISA Certified Arborists in the Greenville, SC Area

Brink, Tom	Timber Tech, Inc., Greenville, SC 29612	(864) 288-8208
Brown, Brandon	Schneider Tree Care, Taylors, SC 29687	(864) 244-3088
Brown, Jason	Schneider Tree Care, Taylors, SC 29687	(864) 244-3088
Carlson, Scott	Schneider Tree Care, Greenville, SC 29615	(864) 449-0391
Cheely, Steve	Cheely Tree Care, Simpsonville, SC 29681	(864) 346-6001
Defibaugh, Denny	Schneider Tree Care, Taylors, SC 29687	(864) 244-3088
Demos, Jackie	Schneider Tree Care, Taylors, SC 29687	(864) 244-3088
Drews, Lucas	Woodland Arborists, LLC, Greenville, SC 29606	(864) 525-3932
Groover, Patrick	Schneider Tree Care, Taylors, SC 29687	(864) 244-3088
Hodge, Jonathan	Schneider Tree Care, Taylors, SC 29687	(864) 244-3088
Jackson, Timothy	Schneider Tree Care, Greenville, SC 29609	(864) 505-1970
Leslie, Samuel	Timber Tech Inc, Taylors, SC 29687	(864) 354-0447
Loftis, James	Schneider Tree Care, Taylors, SC 29687	(864) 244-3088
Long, Andrew	Woodland Arborists, LLC, Greenville, SC 29606	(864) 363-5576
Marchant, Martin	Marchant Arboriculture, Inc., Greenville, SC 29615	(864) 268-3286
Ott, Cindy	Cherry Cove Tree Service, Central, SC 29630	(864) 973-3337
Robertson, Randall	Robertson's Tree Service, Travelers Rest, SC 29690	(864) 244-1854
Schneider, Kurt	Schneider Tree Care Inc., Taylors, SC 29687	(864) 244-3088
Sims, John	Daniels Tree Service, Taylors, SC 29687	(864) 449-3301
Traver, Thomas	Native Yards, Simpsonville, SC 29680	(864) 399-9022

during drought, but also during extended periods of dry weather during the winter (as long as the temperatures are above freezing). Appropriate mulching will also help retain available moisture.

We are told that soil tests are conducted for the trees, although it is uncertain if the trees are fertilized. It also appears that there is no record of the soil test results.

The cemetery trees are vital components of the landscape. They represent part of the historic fabric and steps must be taken to protect that aspect of the landscape and vista. While shoot growth (growth occurring in the present year) and foliage color are often used as indicators of nutrient deficiency, we recommend that soil tests be conducted every one to two years. One source for these tests is the Clemson University Extension Service. A flyer on this

service is available from Clemson at <http://hgic.clemson.edu/pdf/hgic1652.pdf>. A fee is charged for this service, but it is nominal; the results will also provide recommendations on appropriate fertilization. An ISA Certified Arborist can also conduct soil testing and make recommendations on an appropriate fertilization program.

One technique for feeding trees is deep root fertilization – an approach where the liquid fertilizer is injected into the soil with a probe, typically 6 to 12-inches below the surface at a spacing of about 2 to 3 feet. This process not only provides fertilization, but also some aeration of the soil. An alternative approach uses a drill to excavate holes in a similar pattern which are then filled with a granular fertilizer. Either is acceptable.

It is best to fertilize trees when they are actively growing and have available water to help absorb nutrients. In Greenville this is typically from the spring, after new leaves emerge, through mid-season. Fertilizer should not be applied late in the season or during periods of drought.

It does not appear that the trees have received appropriate pruning. During our visit we observed a variety of problems, including deadwood and crossed branches (Figure 34). Other trees, still young, are in critical need of pruning for structure (Figure 35). One young tree exhibits much freeze damage with damaged wood that should have been pruned out at the time (Figure 36).

Thus, many of the trees require pruning for either thinning or cleaning. Thinning is a technique of pruning that removes selected branches to increase light and air movement through the crown. This also decreases weight



Figure 35. Tree pruning needs in the cemetery. On the left is a magnolia with many crossed and damaged branches (note the loss of bark). On the right this canopy needs to be thinned and dead wood removed.

on heavy branches. The natural shape of the tree is retained and its overall health is improved. In cleaning, the pruning removes branches that are dead, dying, diseased, crowded, broken, or otherwise defective. This includes narrow crotches.

Trees should be pruned in such a manner as to preserve the natural character of the plant and in accordance with ANSI A300 (Part 1) - 2001 standards.

In pruning branches should always be cut just beyond the branch collar (an extension of the main stem) and not flush with the trunk. Large branches should be removed with three cuts to prevent tearing of the bark which can weaken the branch and lead to disease. All pruning within the cemetery should be performed by an ISA Certified Arborist,

preferably one who is also an ISA Certified Tree Worker/Climber Specialist. Table 3 provides a list of Certified Arborists for the Greenville area.

Trees should be inspected for potential threats to monuments, as well as general health. Ideally these inspections should be made yearly and after any storm where the winds exceed 55 mph. They should be pruned to remove potentially hazardous dead wood on a yearly basis, but safe pruning every 5 years by a certified arborist is acceptable. Plywood shelters or timber cribbing should be used as necessary to protect stones and monuments during the pruning process.

There are some situations in the cemetery where plantings - largely voluntary it appears - have grown to interfere with stones or fences (Figure 38). Many appear to be the result



Figure 36. Two young trees that should receive pruning to improve their structure.

of a sole focus on “mowing the grass” as opposed to the broader view of “landscape maintenance.” We strongly recommend that these trees be removed, while small, before they become significant problems and damage the cemetery.

Where trees are taken out, the trunk should be cut as close to the ground as possible, leaving the stump in place to decay naturally. No chemical additives should be used to hasten decay, although it is acceptable to paint an herbicide on the stump if it is a tree that will promote suckers.

Pest Control

During this visit we observed no obvious evidence of pests or disease and we understand that relatively little pesticide has been applied in the past. This is good since many pesticides, because of their salt content, can harm monuments. Where possible Integrated Pest Management practices should be implemented. Where chemical

pesticides are necessary, they should be applied as a coarse spray or as granules to prevent drift.

Shrubbery and Plantings

Selection and Planting

It appears that most plantings in the cemetery have been undertaken by family members. There appears to be no plan and the shrubs are scattered across the grounds.

This laissez faire approach will, over time, have the result of

dramatically altering the historic landscape and appearance of the cemetery. Shrubbery is as important to the appearance of the churchyard as its trees and the church must begin to take a much more proactive approach with much more



Figure 37. Freeze damage to bark that should have been pruned out.

careful maintenance of the shrubbery.

Plantings should seek to maintain the historic context of the cemetery, at least in the



Figure 38. Example of volunteer growth that should be removed before it harms the ironwork.

historic core. Plants such as boxwoods, elaeagnus, forsythia, and crepe myrtle are appropriate. These and similar historic planting should be chosen to replace existing shrubs when necessary.

Often, when left to their own devices, the public will select plantings that are grossly inappropriate – either for a cemetery or for the specific location in the cemetery. As one example, we found a hosta – a shade and moisture loving plant – planted in full sun (Figure 39).

The absence of planned plantings also creates additional maintenance costs to the cemetery. Plantings may be in the way of routine maintenance and require use of less effective maintenance procedures. Another issue worth noting is that often the public tires of maintenance, so that over time the shrub,

untended, overwhelms nearby stones and fences.

The cemetery should establish a rule requiring approval of any plantings and



Figure 39. Hosta suffering from its planting in full sun and lack of watering.

specifying that any unapproved plantings will be removed. If such a rule already exists, it should be enforced.

Fertilization

As with trees, the best indication of the need for fertilization is a soil test, which should be performed at least every two to three years. While some shrubs, such as boxwood, provide an indication of deficiency through the yellowing of lower leaves, such evidence can be missed and does not indicate the extent of the problem.

Where fertilization is necessary, most shrubs, because of their shallow root systems, respond adequately to broadcasting the appropriate organic fertilizer around the base of the plant, typically at the drip line.



Figure 40. Shrubbery problems at Christ Church. Clockwise: inappropriately pruned boxwood giving it a fanciful shape; unpruned boxwood that is overwhelming its stone; the interior of the boxwood is dead because of inappropriate shearing; spirea that has been incorrectly pruned to an unnatural shape, destroying its beauty; planting overwhelmed by trash vegetation that has never been removed; leggy boxwood that should be either removed or pruned for renewal; ivy is damaging to stone and masonry and should not be allowed to climb stones.

Most shrubs should be fertilized when they are actively growing and have available water to help absorb nutrients. Broad-leaved evergreens, such as boxwood, are best fertilized in the winter or spring. Summer or fall fertilization of these plants may induce late season growth that is highly susceptible to winter injury. Some plants which exhibit episodic growth, such as forsythia, may benefit from a more continual fertilization program based on soil analysis and plant growth response.

Pruning

It is again in the category of pruning maintenance that we see the greatest problems at Christ Church Cemetery. In general the shrubbery has been either over pruned, creating unnatural and fanciful shaped creations, incorrectly pruned, to allow the accumulation of significant amounts of deadwood, or the shrub has simply not been pruned (Figure 39).

When shrubs are headed back or sheared routinely (as we see at Christ Church), a lot of dense, thick new growth is produced near the outer portions of the canopy. As a result, less light reaches the interior portions of the plant, leaves within the canopy become sparse, and the plant appears stemmy and top-heavy. This is seen particularly in the churchyard's boxwoods – many of which are in very poor condition.

To avoid this problem, head back the shrub's shoots to several different heights. When heading back, make the cut on a slight slant one-quarter inch above a healthy bud. The bud should be facing the direction preferred for new growth.

Boxwoods are best pruned, rather than sheared, to maintain a natural shape and to keep plants at a desired size so that they do not outgrow their landscape too quickly. With much deadwood on their interiors significant rehabilitation is necessary. An excellent instruction on boxwood pruning is provided by

the U.S. National Arboretum at <http://www.usna.usda.gov/Gardens/faqs/BoxwoodThinning.html>.

Thinning (cutting selected branches back to a side branch or main trunk) is usually preferred over heading back. Thinning encourages new growth within the interior portions of a shrub, reduces the size and provides a fuller, more attractive plant.

There are examples of shrubbery at Christ Church that have been planted too close to stones and monuments. As the plants have matured, they have overgrown their location, over taking the monuments. In some cases the shrubs have been very unnaturally pruned around the monument. In such cases the correct approach is to prune severely, a process called renewal pruning, to bring the plants back into scale with their surroundings.

Renewal pruning means cutting the plants back to within 6 to 12 inches of ground level. In this instance, timing is more important than technique. The best time to prune severely is before spring growth begins. Pruning in late fall or midwinter may encourage new growth which can be injured by cold. Renewal pruning results in abundant new growth by midsummer. Once the new shoots are 6 to 12 inches long, the tips should be pruned to encourage lateral branching and a more compact shrub.

Renewal pruning works well with most broadleaf shrubs, while narrow-leaf evergreens (such as boxwood) do not respond well when severely pruned and may actually decline. A better approach for these narrow-leaf evergreens is cutting them back slightly and transplanting – moving them away from the stones they are obscuring.

An alternative to the drastic removal of top-growth on multiple stem shrubs is to cut back all stems at ground level over a period of three years. At the first pruning, remove one-third of the old, mature stems. The following



Figure 41. Examples of trash vegetation that is being allowed to overtake some landscape. The upper left photo illustrates a range of weedy plants in the shadow of a boxwood, as well as broken masonry; upper right shows weedy vegetation to the right of a boxwood that has been ignored for so long that it is beginning to compete with the boxwood for space. The lower left photo shows a number of poison ivy plants along a cemetery fence; lower right shows abundant trash and weedy plants along the eastern fence line, beginning to overtake plots.

year, take out one-half of the remaining old stems and head back long shoots growing from the previous pruning cuts. At the third pruning in yet another year, remove the remaining old wood and head back the long new shoots.

Common landscape shrubs, like crape myrtle, are often pruned as tree forms. The best time to begin a tree form is in late winter before spring growth begins. It is easiest to start a tree form from a 1-year-old plant, but you can also use older, mature plants. Select one to three of the most vigorous growing trunks or upright branches (depending on the number of main trunks desired) and prune all other upright (vertical) branches to ground level. Remove lateral branches that are less than 4 feet off the

ground along the main trunk and thin the canopy by getting rid of inward growing branches or branches that cross one another. Avoid shearing since this will result in a high-maintenance topiary that is out of place in the cemetery setting.

In general, summer-flowering plants should be pruned before spring growth begins since these produce flowers on the current season's growth. Spring-flowering plants, such as forsythia, should be pruned after flowering since they produce flowers on the previous season's growth.

Another problem worth special mention is the amount of trash vegetation in the

cemeteries. Some plantings have become so overwhelmed by trash vegetation that it is difficult to determine what the original planting was. We found many examples of trash vegetation beginning to grow up in the shade of the plantings through inadequate care. We also found several locations where poison ivy was abundant – indicating that the existing land care

turfgrasses, and it has fair to good shade tolerance and good drought tolerance. It is, however, at the edge of its preferred habitat and it appears to be under considerable stress. This may be the result of several years of drought coupled with inadequate weed control. This stress may have allowed the growth of the bermudagrass that we observed in several areas



Figure 42. Example of scalped grass in the cemetery.

firm has been doing very little to control this noxious plant (Figure 41).

The shrubbery at Christ Church has been ignored for a very long period of time and, as a result, many of the plants are in very poor condition. Those which can be saved by careful pruning should be. Those which are dead or which cannot be rehabilitated should be removed and similar species replanted.

The condition of the shrubbery at Christ Church provides an excellent example of why the use of untrained individuals (whether under contract or in-house) should be avoided and why only certified, trained technicians should be allowed to work within the cemetery.

Turfgrass Issues

The bulk of the cemetery appears to be covered in centipede grass, which is well adapted to infertile soils. It spreads by stolons, producing a medium-textured turf. Maintenance requirements are low when compared to other

of the cemetery. Bermuda is more tolerant of drought and is a faster grower than centipede.

Mowing

The current contractor appears to be using a Toro Zero Turn 52-inch deck mower – a commercial mower designed for relatively large and open expanses. Such mowers are not suited for a cemetery context with fragile stones, coping, and many three-dimensional objects. These large mowers, even with so-called “floating” decks, are also designed for relatively level terrain. Where there are irregularities – typical of a cemetery – these mowers tend to scalp the grass (Figure 42). Scalping shocks the grass and growth slows or stops, reducing the vigor of the turf. The lawn will also dry out more quickly, especially under drought conditions, and is far more likely to be invaded by weeds.

The one mower observed did not have protective bumpers installed. Closed-cell foam should be installed on all mowers to help

minimize damage to stones caused by accidental impacts.

No push mowers were observed, but these are much more suitable for cemetery maintenance, especially in the historic core. These are typically available with 20-22 inch decks – more easily maneuvered around monuments and coping.

However, mowing should be undertaken when growth conditions warrant. For example, during the current drought, it seems unlikely that centipede will require weekly mowing to maintain its recommended height of 1½ inches.

Clippings should not be bagged – not only can the bag cause damage to stones and



Figure 43. Inappropriate mower and trimmer actions damage stones. The upper left photo shows both mower impact and string trimmer damage; the upper right photo shows that the footstone has been driven over by a mower, scalping the stone. The lower left photo shows multiple, parallel scraps – evidence of string trimmer damage; lower right photo shows tire tracks across a ledger.

Mowing during the growing season is conducted weekly. While mowing less frequently may have some appeal, the removal of grass adjacent to monuments would become more difficult with longer and thicker grass blades – and this in turn could lead to more damage to the stones.

make maneuvering the equipment more difficult, but the clippings when left on the ground will provide nutrients.

In addition to mowing, nylon trimmers are used around monuments, coping, fencing, and plantings. This is an acceptable practice, but it is critical that a very light weight line be used

– along with worker attention – to minimize damage to soft stone such as marble.

Based on discarded string sections found in the cemetery, it appears that the weight of the line being used is 0.095 inch. In addition, the line is shaped with sharp cutting edges.

We recommend that the line thickness not exceed .065-inch. This is a very light line – but maintenance crews should *only* be using this



Figure 44. Stones are not swept off after mowing and trimming, leaving the clippings to coat the stone. This is inappropriate.

equipment to trim grass and in this context the line is perfectly acceptable. A shaped line is also prone to cause more damage than a round line.

Figure 43 reveals damage done to markers by mowers and string trimmers with heavy line. It is essential that those performing cemetery maintenance be adequately trained – and that the church oversees the work. Contractors should be expected to pay for all damage caused by their workers.

Mowers, regardless of the type, should not be driven or operated over stones (Figure 42). This is not only disrespectful and unprofessional, but it can cause extensive damage to the monument. Evidence of this

practice was seen throughout the cemetery and the practice must be stopped immediately.

It is also appropriate that grass clippings be removed from stones by sweeping or blowing (Figure 44).

Fertilization and Weed Control

Routine soil tests are not being conducted in the cemetery and at the present time it does not appear that there is a fertilization program. Normally this might not be a significant issue since centipedegrass requires relatively little fertilization and additional nitrogen would simply require more frequent mowings. Nevertheless, we do recommend several soil tests on a yearly basis, primarily to determine the acidity of the soil (which may need adjustment) and to allow an evaluation of the need for nitrogen and potassium (centipede does not generally receive phosphorus fertilizer). The addition of potash in September through November may enhance winter hardiness.

In a cemetery setting organic fertilizers should be the primary choice. These materials, such as cottonseed meal and bone meal, have much lower salt indices than inorganic fertilizers – resulting in reduced salt uptake by monuments. This is important since salts cause staining, spalling, and deterioration of marbles, sandstones, brick, and even granites. In addition, organic fertilizers have a slower release rate and are easy on the root systems.

An excellent source explaining different organic fertilizer choices is <http://www.cmg.colostate.edu/gardennotes/234.pdf>. The publication at <http://pubs.caes.uga.edu/caespubs/pubs/PDF>

[/C853.pdf](#) provides information on converting traditional inorganic fertilizer recommendations to safer organic recipes.

We do not believe that the current landscape contract calls for the use of herbicides. There is a legitimate concern over the use of herbicides in a cemetery setting. Many herbicides contain salts and these can migrate into stones (especially sandstones and marbles), causing discoloration, spalling, and other damage. Some herbicides also break down into chemicals that can damage stones.

It may, however, be necessary to begin pre- and post-emergent treatments in an effort to rehabilitate some of the lawn areas. Broadcast herbicides should be swept off all stones after application. Sprays should be coarse and applied on windless days. Either technique will require careful application and we recommend avoiding areas immediately around stones, if possible.

Limitations on the use of herbicides may reduce the effectiveness of a single treatment, but over several years the prevalence of weeds will decline.

Pest Control Practices

One of the most significant pest problems in many cemeteries are fire ants. These pests are not simply an aesthetic nuisance, obscuring stones and creating mounds, but may also hinder appropriate lawn care activities, such as mowing. They are also a public health threat and present a significant liability to the cemetery. One survey done in 1998 concluded that 33,000 people in the state of South Carolina sought medical attention as a result of fire ant stings. Of those 15% had severe localized allergic reactions and 2% had severe systemic reactions resulting in anaphylactic shock.

During this assessment we observed no fire ant nests. This may be the result of a successful treatment program, or it may be the result of the severe drought conditions (when fire ants tend to nest deeper underground).

Regardless, we recommend that the cemetery begin a treatment program at the first sign of fire ants. An excellent publication, *Managing Imported Fire Ants*, is available at www.clemson.edu/sandhill/userfiles/file308.pdf.

Bait products such as Amdro, Award, or



Figure 45. Animal burrow found in the cemetery (quarter shown for size comparison).

Logic are effective on individual mounds, although control is not immediate. Broadcast applications, however, are even better and it appears that a mixture of 3/4 lb. hydramethylnon in baited granules (under trade names "Amdro" or "Siege") and 3/4 lb s-methoprene in baited granules (under trade name "Extinguish") applied per acre is very effective. Amdro/Siege, a metabolic inhibitor, takes 3-6 weeks after ants consume it to show an effect and the effect lasts for several months until a re-invasion occurs. Extinguish is a growth regulator that takes longer to show an impact, but then can last a year or more.



Figure 46. Examples of heavily compacted area requiring renovation.

We did observe animal burrows in the cemetery (Figure 45). They are not immediately recognizable, but the cemetery should seek to identify the pest and determine if a treatment strategy is necessary.

Renovation

There are a many areas in the churchyard where the centipedegrass has almost completely failed or where it has been heavily invaded by weeds. We recommend that the church implement a renovation program in these areas in order to establish a good stand of centipedegrass.

In most areas lacking grass, it appears that one significant problem is compaction and infertility. Extensive core

aeration, coupled with the addition of humus and/or soil conditioners are needed.

With a good soil bed, centipede sod should be laid in a checker-board pattern with the ends butted up tight to allow for shrinking when the sod dries. Rolling of the sod after placement will allow for a good sod to soil contact, enhancing rooting. Frequent watering is needed during the first few weeks until the plant establishes a good root system, but this can be provided by spot watering.

In heavy shade areas under trees where centipedegrass fails to perform effectively, we recommend that the sod be removed (which rarely does well in such circumstances) and be replaced with 3-4 inches of mulch. This will also promote better tree health.

Irrigation

The cemetery does not have an irrigation system and, in general, we do not recommend them – they use very large quantities of water, their placement can interfere with markers and graves, and their operation



Figure 47. Dead grass, and compacted, infertile soil has lead to an invasion of weeds in this area of the cemetery.

can cause erosion to stones.

The Cemetery does, however, have water lines with hose bibs throughout the cemetery. This is an entirely satisfactory arrangement, since it allows specific lawn areas that might be stressed by drought to be watered. In addition, areas where the lawn is being renovated can be watered to encourage the sod to root.

None of bibs, however, have anti-siphon devices installed. Such devices prevent possibly contaminated water from being drawn back into the city water supply should there be a drop in water pressure. We recommend that they be installed on all faucets.

Given the current drought conditions it is critical that the church carefully manage irrigation. One reasonable approach is to only irrigate new landscaping, using techniques that will reduce water waste (such as irrigating early in the morning or in the late evening).

Proposed Grounds Maintenance Guidelines

We have been given a copy of a document ("Christ Church Grounds Maintenance Guidelines") that we understand the church intends to use as a guide for future cemetery landscape activities. Many of the issues in this document have already been discussed in our assessment. Nevertheless, it may be helpful to briefly mention a few issues that bare additional discussion.

Item 2B recommends the use of baggers. Grass clippings do not contribute to thatch and allowing the clippings to remain on the turf will recycle nutrients that would otherwise be lost. Most mowers today have the ability to mulch the clippings, further reducing their size. Side bags make maneuvering through the cemetery more difficult; any bagging increases the time required to do the mowing.

Item 2D specifies that the grass will be kept below 6-inches in height. This is extremely high for either centipede (which is typically cut at 1 to 1½ inches) or bermuda (typically cut at 1-inch). Allowing the grass to grow to this length will make mowing very difficult, potentially causing damage to unseen stones and coping. Taking 4-5 inches of grass off in one mowing will also result in stressing the grass and potentially killing much of it, especially under drought conditions.

Item 2G calls for the use of Round-Up. We recommend caution in the use of any herbicide since it can cause extensive damage to the stones.

Item 3I calls for the trimming of the English ivy in the cemetery, maintaining a "neat appearance on headstones" As previously mentioned, vegetation (including ivy) should be removed from headstones. Trimming should keep the ivy confined to specific plots.

Item 4A calls for pruning with "hedge trimmers." In general we discourage the shearing of plant materials. Shearing encourages luxuriant growth that shades the interior of the plant. Shrubs should, instead, be hand pruned.

We include, as Appendix B, a sample contract for landscape services. The church may wish to examine this document to further evaluate landscape options and needs.

Recommendations

Whether contracted out or conducted in-house, the church should ensure that there is adequate staff to maintain the cemetery. If the work is done in-house we recommend a full-time staff of a "hands-on" supervisor and two technicians. Their efforts should be devoted exclusively to the cemetery. These individuals should be, at the time of their employment or within the first year, certified by PLANET (or a similar organization) in the fields of Landscape Technician - Exterior, Turfgrass

Professional, or Ornamental Landscape Professional.

The church should work to ensure of continuity of the staff by providing appropriate pay levels, fringe benefits, and educational opportunities.

Tree selection within the cemetery should be focused on historically appropriate species, based on replication of identified historic trees in the Cemetery or using period lists. Species should, however, be evaluated to eliminate those with problems such as suckers, surface roots, inherent weakness, etc. The cemetery should develop a tree plan to ensure that when any tree must be removed, an appropriate replacement is planted in its place.

The trees in the cemetery exhibit a variety of maintenance issues, including pruning needs, inappropriate planting techniques, under or over mulching, and inappropriate placement. These problems are likely the result of either deferred maintenance or the use of individuals with inadequate training and expertise. Only ISA Certified Arborists should be responsible for tree pruning. Routine maintenance activities should be undertaken by individuals who have appropriate training.

Trees within the cemetery should be fertilized on a routine basis and should be professionally evaluated and pruned at least once every 5 years by an ISA Certified Arborist. All trees should be inspected yearly and after any storm with winds in excess of 55 mph.

The cemetery shrubbery is in particularly poor condition, evidencing years of neglect and/or inappropriate pruning. There is much deadwood, especially in the boxwoods. Much of the shrubbery requires renewal pruning. We recommend that if the church cannot devote trained staff to care for these issues that they let a contract specific for the renewal and rehabilitation of the shrubbery on the cemetery property.

We recommend that the church establish a policy that prohibits or limits lot plantings. When permitted they should be suitable for the plot and historically appropriate.

We recommend that only 20-22 inch power mowers be used in the cemetery. The equipment should be fitted with closed cell bumpers. In the past monuments have been damaged by the operation of mowing equipment; the church must take a much more proactive stance to supervise maintenance activities.

Nylon trimmer line used in the cemetery should be no thicker than .065-inch. Technicians should be trained to avoid damaging stones while using this equipment.

Soil analysis should be conducted to determine if adjustments are necessary for the turfgrass, shrubbery, or trees. Only organic fertilizers should be used to minimize damage to the stones.

Turf exhibits considerable stress. Factors include incorrect mowing practices (such as scalping), drought (and the failure to provide spot irrigation), and soil compaction. This has resulted in decline, with the increase in weeds and introduction of bermudagrass in the centipede areas. Renovation is necessary in a number of areas.

Heavily shaded areas should be taken out of turf and mulched instead. Care must, however, be taken to ensure that the mulch does not exceed 3-inches in depth or comes into contact with tree bark.

Limited preemergent and postemergent weed control should be instituted at the cemetery, taking care to avoid stones. The herbicides will affect the stones and this work will need to be very carefully done to ensure that the stones are not damaged.

The cemetery should ensure that pests such as fire ants are controlled. Other pests should be identified and controlled, if necessary.

Anti-siphon devices (vacuum breakers) should be installed on all hose bibs throughout the cemetery.

CHRIST CHURCH CEMETERY, GREENVILLE, S.C.

OTHER MAINTENANCE ISSUES

Signage

From a cemetery preservation perspective, signage is of four basic types: identification, regulatory, informational, and interpretative. They are generally recommended in this same priority.

Identification signage might include the name of the cemetery and might also include the cemetery's date of founding and historic significance (i.e., listed on the National Register).

Regulatory signage specifies laws, regulations, or expected standards of behavior. We recommend that all cemeteries develop signage dealing with, minimally, these issues (perhaps with some modifications of language as might be needed):

- ❖ The stones and monuments in this cemetery are fragile. Please refrain from leaning, sitting, or climbing on any monument or mausoleum. All children must be escorted by an adult.
- ❖ Absolutely no alcoholic beverages, fireworks, or fire arms are allowed in the cemetery. Proper conduct is expected at all times.
- ❖ Cemetery hours are from 8:00 am to 5:30 pm.
- ❖ Many of the stones in this cemetery are very old and may be easily damaged. Consequently, absolutely no gravestone rubbings will be allowed.
- ❖ No pets are allowed in the cemetery.
- ❖ Flowers will be removed by the staff 10 days after holidays or when the

arrangements become wilted and unsightly.

- ❖ No plantings are allowed within the cemetery and the cemetery will enforce its right to remove any plantings deemed inappropriate, diseased, or damaging the cemetery.
- ❖ For additional information concerning maintenance issues, please contact _____ at _____. In case of emergency contact _____.

The last two types of signage are informational (for example, directional signs) and interpretative (information on historic people buried in the cemetery).

Christ Church Cemetery has only one sign – and that sign deals with church services, not the cemetery (Figure 48). This is a significant oversight and it should be corrected immediately.

The existing sign should be moved closer to the church, chapel, or entrance. Minimally, signage should combine identification and regulatory functions. It is critical that those entering the cemetery be notified of the rules.

Signage should be erected at each of the three vehicular entrances and two pedestrian gates.

While not immediately critical, the church should give consideration to converting the available historical research to a meaningful and compelling history of the cemetery. It should be written to engage not only parishioners, but also those who may stop by

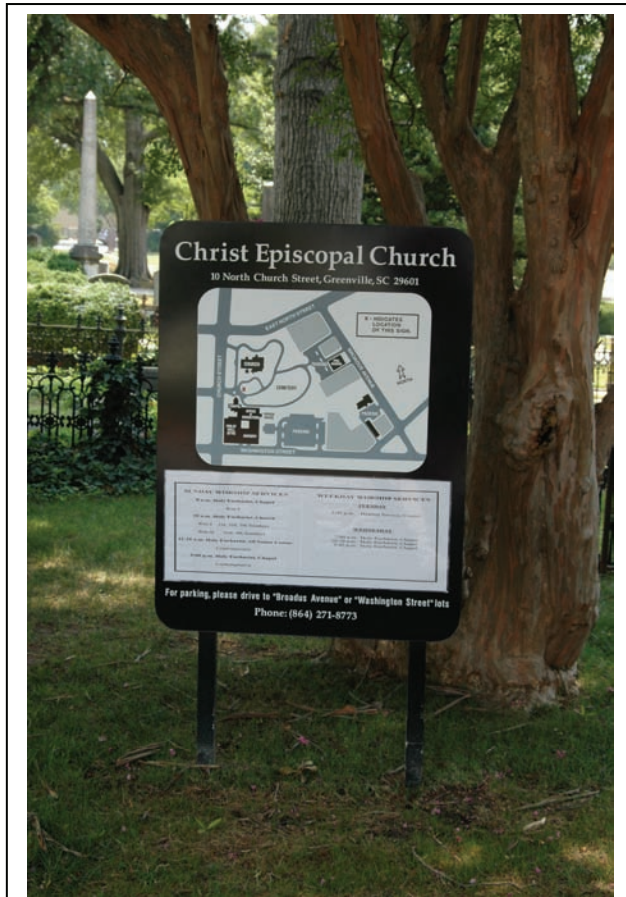


Figure 48. The only signage at the Christ Church cemetery fails to provide any information about the cemetery.

the cemetery from out of town. Topics might include information on the types of stone in the cemetery, Greenville stone carvers, the types of monuments, Greenville funerary customs, more interesting stories concerning the individuals (with explanations that make it obvious why we should care), and information on the landscape. It should provide a story, not a dry recitation of facts.

Such a brochure can also be used to repeat the cemetery rules (perhaps on the back cover), as well as solicit funds for cemetery upkeep.

Flowers and Other Grave Decorations

There appear to be no flower regulations concerning the cemetery, although the proposed grounds maintenance guidelines do attempt to tackle this issue. The two items specify that flower arrangements will be removed “once they are dead or look bad,” however as written this would apply only to funeral arrangements and not to other flowers. A second item specifies that Christmas wreaths (but not flowers) would be removed as determined by the Facilities Supervisor.

These rules are rather vague and open to interpretation. As an alternative, we recommend that flowers or arrangements should be removed by the cemetery staff 10 days after holidays *or* when the arrangements become unsightly. This will allow staff to remove faded flowers, all seasonal decorations, and so forth. It also provides some discretion, since potted plants may last longer than cut flowers.

We also recommend that the cemetery establish a regulation that all floral displays in the new sections (i.e., outside the historic core) must be placed in vases integral to the stone or that a monument mounted vase holder be used. These choices provide a wide range of cost options for families while still ensuring that the maintenance staff can perform their duties. These are available from a variety of monument companies for about \$20 retail or could be ordered by the cemetery and sold directly (see www.thompsonmonuments.com/flower_holder_s.html).

At Springwood Cemetery in Greenville, the regulations specify: “holiday arrangements and floral pieces shall be removed by the Parks and Recreation Department from the cemetery grounds after fifteen (15) days of the holiday or when they become wilted and unsightly.” The proposed rule for Christ Church is slightly more stringent, but otherwise entirely in keeping with those of the other major historic cemetery in the city.

Many cemeteries are beginning to also struggle with the increasing tendency for the public to load graves with personal items. This problem is not unique to the United States, but has also been documented in Great Britain, where solar-powered lights, statues and windmills have appeared.

Some cemeteries have established rules based entirely on appearances. At times these are intentionally vague, for instance referring to “adornments considered offensive or otherwise inconsistent with the dignity of the cemetery.” In other cases a fairly detailed list of objectionable items has been devised: “toys, stuffed or otherwise manufactured or sculptured animals, statues or statuettes, personal items and/or other unsightly objects.”

Although aesthetics may reasonably be considered to suffer, most cemeteries attempt to control the proliferation on the grounds of the potential hazard to workers – a legitimate concern considering the use of mowers and trimmers on a routine basis.

Many cemeteries enact provisions that allow staff to remove such objects (“temporary objects”) when they become withered, unsightly, or an obstruction to maintenance. Other cemeteries exclude all objects made of concrete, glass, plastic, fiberglass, metal, ceramic, and wood, again with the justification of safety. Some cemeteries have also prohibited other items for safety: “no hanging poles, no bird feeders, no glass containers, no ceramic figurines, no statuary, no concrete pots, no toys, no rocks, no bricks, or any other objects that may be hazardous to personnel or equipment.”

While wishing to be sensitive to those who have lost loved ones, there must still be a middle ground that helps control the abundance of materials beginning to appear on some of the plots at Christ Church. This is an issue that should be given careful attention by the caregivers. Figure 48 illustrates problems in several lots.



Figure 49. While the top items can be worked around, the middle plot poses significant maintenance problems. In addition, the sun dial is an impalement hazard and liability. The bottom grave could be seen as excessive in the range and amount of materials present.



Figure 50. Accumulations of trash in the cemetery indicate that the landscape maintenance crews must do a better job at collecting debris.

Trash

We found abundant evidence of trash throughout the cemetery – suggesting that the existing landscape maintenance crew is not aggressively dealing with this problem.

Figure 50 shows several areas where trash has accumulated – around benches, in areas of ivy, along fence lines, and even in urns and other monuments. The presence of Easter egg shells in mid-July, dating from late March, gives clear evidence that no real effort is being made to collect trash in the cemetery.

We are also concerned that of the three trash cans examined, all contained trash and each one contained one or more alcohol containers (Figure 51).

Section 24-215 of the City of Greenville Municipal Code makes it illegal to have an open alcohol container on public streets. Although the churchyard is private property, this alcohol had to come onto the property from one of the public avenues. This once again demonstrates the importance of posting regulations on the cemetery property. We also recommend that this issue be discussed with the Greenville police and a request be made for their patrols to pay special attention to the possibility of open containers in and around the church property.

We recommend that the maintenance crew check the grounds for litter and debris at least every other day. Trash cans should be emptied at least weekly and more often depending on what types of materials are present.

Monument Subsidence

There are areas in the cemetery where coping and monuments have begun to disappear below the turf. This is generally the result of either graves collapsing and allowing stones to sink or soil building up around interment as the spoil is not removed. Figure 52 illustrates several of these problems.

Regardless of the cause, the cemetery should begin a maintenance program to ensure that monuments and curbs are above grade and the turf around them is properly trimmed.

Resetting can be accomplished by excavating the items, infilling with pea gravel to provide a stable base, and replacing the monument or curbing, ensuring that it is plumb and level.

The grounds should be examined at least yearly to identify stones that require resetting. This is often done in the winter after



Figure 51. All of the examined trash cans at Christ Church contained beer bottles. An effort must be made to reduce the amount of alcohol passing through the cemetery. Trash cans must also be emptied more frequently.

the growing season is over and maintenance crews can focus on other issues.



Figure 52. Marker and coping disappearing below the ground surface.

Recommendations

The church should develop regulatory signage for use at the cemeteries. This signage should minimally deal with proper care of the monuments, prohibiting rubbings and warning visitors of their fragile condition; it should prohibit certain behaviors and actions, such as use of alcoholic beverages; it should establish simple guidelines for plantings, as well as the placement and removal of floral and grave decorations; and it should include contact and

emergency information. The signage should be designed to be uniform and consistent with other signage already being used.

The cemetery should receive identification signage at all five entrances. All five entrances should also have regulatory signage.

The cemetery may wish to develop an interpretative brochure for visitors. Such a brochure should ensure broad interest and be relevant to a broad spectrum of the public by telling a compelling story. The cemetery should avoid appealing only to parishioners or only telling the stories of the rich and famous.

The cemetery should establish flower regulations for its cemetery that maintains the dignity of the cemetery and allows reasonable maintenance. We recommend that all floral displays be either in a vase integrated into the flush marker or use a flower holder. Either will allow more appropriate maintenance. Seasonal displays should be removed immediately after the holiday; plants should be removed immediately once wilted. The church should consider limiting flowers on graves to a maximum of 10 days.

The cemetery exhibits a scatter of trash that suggests the landscape crews are not adequately proactive in collecting litter. This should be given a higher priority.

There is evidence of alcoholic beverages being taken into the cemetery. Given the vandalism problems, steps should be taken to control this practice. We recommend signage prohibit alcohol on site and also that the church encourage the Greenville police to take a more proactive approach to this concern.

Graves and coping are sinking in different parts of the cemetery. The maintenance crews should begin a program to reset these items on a routine basis, perhaps checking the churchyard for problems once a year.

CONSERVATION ISSUES

What is Conservation?

Conservation is *not* restoration. Restoration means, very simply, making something “like new.” Restoration implies dramatic changes of the historic fabric, including the elimination of fabric that does not “fit” the current “restoration plan.” Restoration is inherently destructive of patina and what makes a property historic in the first place. The “restorer” of a property will know nothing of the Secretary of the Interior’s Standards for Preservation and care even less.

One of the most important early writings was that of nineteenth century art critic and observer John Ruskin. In *The Seven Lamps of Architecture* published in 1849 and in particular, “The Lamp of Memory,” Ruskin introduces us to the issue of trusteeship where he explains,

it is again no question of expediency or feeling whether we shall preserve the buildings of past times or not. We have no right whatever to touch them. They are not ours. They belong partly to those who built them, and partly to all the generations of mankind who are to follow us.

Ruskin also crisply stated the difference between restoration and repair, noting that “restoration” means,

the most total destruction which a building can suffer: a destruction out of which no remnants can be gathered: a destruction accompanied with false description of the thing destroyed.

In contrast, conservation can be defined as preservation from loss, depletion, waste, or harm. Conservation seeks to limit natural deterioration.

Conservation will respect the historic fabric, examine the variety of options available, and select those that pose the least potential threat to the property. Conservation will ensure complete documentation, whether it is of cleaning, painting, or repair. Conservation will ensure that the work done today does not affect our ability to treat the object tomorrow.

Standard for Conservation Work

As Ruskin stated, Christ Church is the steward of this cemetery, holding what belonged to past generations in trust for future generations. As such the church bears a great responsibility for ensuring that no harm comes to the properties during its watch.

One way to ensure the long-term preservation of these properties is to ensure that all work meets or exceeds the Secretary of the Interior’s Standards for Preservation, discussed on pages 2-3 of this study.

Another critical requirement is that the church ensure that any work performed in the cemetery – whether it involves the repair of iron work, the cleaning of a stone, or the reconstruction of a heavily damage monument, is conducted by a trained conservator who subscribes to the Standards of Practice and Code of Ethics of the American Institute for Conservation of Historic and Artistic Works (AIC).

These Standards cover such issues as:

- ❖ Do no harm.

- ❖ Respect the original fabric and retain as much as possible – don't replace it needlessly.
- ❖ Choose the gentlest and least invasive methods possible.
- ❖ Is the treatment reversible? Is retreatment possible?
- ❖ Don't use a chemical without understanding its affect on the object and future treatments.
- ❖ Don't falsify the object by using designs or materials that imply the artifact is older than it is.
- ❖ Replication and repairs should be identified as modern so that future researchers are not misled.
- ❖ Use methods and materials that do not impede future investigation.
- ❖ Document all conservation activities – and ensure that documentation is available.
- ❖ Use preventative methods whenever possible – be proactive, not reactive.

The AIC Code of Conduct also requires a professional conservator provide clients with a written, detailed treatment proposal prior to undertaking any repairs; once repairs or treatments are completed, the conservator must provide the client with a written, detailed treatment report that specifies precisely what was done and the materials used. The conservator must ensure the suitability of materials and materials – judging and evaluating the multitude of possible treatment options to arrive at the best recommendation for a particular object.

General Types of Stone Damage

Although a stone-by-stone assessment was not included in this assessment, it is possible to provide some general observations concerning the types of problems faced by the cemetery.

There are many examples of broken stones – some as a result of the recent

vandalism, but others evidencing much older failures. Many of these stones should receive a high priority for conservation treatments since the stones are either a hazard to the public (endangering visitors) or a hazard to themselves (if they fall there will be additional, significant damage that will dramatically increase the cost of repair).

The identification of these stones and development of treatment proposals by a professional conservator should be a very high priority. It is only with the development of detailed treatment proposals and cost estimates that a reasonable budget for this conservation work can be determined. Given the deterioration of the historic fabric, we recommend this work be conducted over the next 1 to 2 years.

In most cases gravestones are fragile and their repair is delicate work. There are many commercial products on the market, used by commercial stone companies, which are totally inappropriate for historic stone.

As an example, we found a broken obelisk that had been repaired using setting compound. This material is designed for the setting of stable granite die on base monuments. The material is intended to prevent the die from slipping on the base, but it is not intended to be a repair material. Use of it in this way exposes the church to considerable liability when the "repair" fails – and there is no doubt that it will.

During our examination, we found that the "repaired" obelisk had not been set on its base and was still unstable. With only about 20 pounds of force the setting compound failed. This means that even a small child could have toppled the obelisk.

It is very important that the church not attempt repair of damaged monuments. The staff has no training or expertise in this area. With the availability of insurance, the church should seek treatment proposals from a



Figure 53. Example of improper repair. Monument setting compound was used to reset the obelisk at A, but this has failed with very little force. In addition, the base is also unattached at B. This monument represents a serious threat to the public.

professional conservator and make a claim for recent damage, based on the professional estimate for the cost of repair.

Appropriate conservation treatment will usually involve drilling and pinning, carefully aligning the two fragments. Threaded 316 stainless steel rod (or occasionally nylon) and epoxy adhesives formulated for the specific stone are used in this type of repair. Diameters and lengths of pins vary with the individual application, depending on the nature of the

break, the thickness of the stone, its condition, and its expected post-repair treatment.

Sometimes pins are not used in a misguided or misinformed effort to save time and money. Instead the pieces are simply joined using a continuous bead of epoxy or some other adhesive. Experience indicates that for a long-lasting repair, particularly in structural applications, use of pins is necessary. Moreover, most adhesives are far stronger than the stone itself, meaning that failure of the repair is likely to cause additional damage to the stone.

At times mechanical repairs also involve dismantling intact elements and ensuring that a sound foundation is present. Foundation work may involve filling in depressions, establishing a concrete footing, or taking other measures to ensure that subsidence is minimized. Then the entire structure is repaired as it is reassembled.

There are also a number of loose stones or stone fragments. These, too, may pose a significant risk to the public, depending on the size and degree of instability of each stone. Some stones will require equipment to allow disassembly and correctly repair. Others are smaller and the treatment may involve drilling for the installation of stainless steel pins to help hold the stone in place. A few of the problems may be resolved using commercial setting compound.

Fragment storage protects fallen or broken stones from loss and damage. At present there appears to be no procedure to ensure that damaged stones are identified and cared for. We found bits and pieces of stones in different locations throughout the cemetery. In many cases broken stones have been left lying where they fell. This may result in the loss of the monument or additional damage. It may cause loss of the grave, loss of the individual's memory, as well as loss of historic fabric.

Many of the stones were noted with ferrous pins. The results of their deterioration is



Figure 54. Examples of broken stones requiring professional conservation. Upper left shows a broken ledger that exposed a vault below; this is a serious trip hazard. Upper right shows a broken headstone. Middle left shows a broken tab in socket; the upper portion shows a failed epoxy repair, illustrating the problem with using epoxy. Middle right shows a broken obelisk that will require pinning, as well as pinning to its base to ensure safety to the public. Lower left shows a stone broken so long ago that grass is beginning to grow over it. Lower right shows another very old damaged stone. All of these stone require drilling and pinning, with the breaks then infilled with a repair mortar.



Figure 55. Other stone problems. Upper right photo shows a displaced cradle side board. The cross on the interior does not belong with this monument and should be collected and stored safely until its monument is found. Upper right monument requires pinning. Middle left monument shows an impalement hazard to the public. Middle right is an example of a monument that could easily be reset by the cemetery staff. Lower row shows examples of tilted monuments that can be reset by the cemetery staff.

also clearly evident. These should be given a high treatment priority since, left untreated, the corrosion will cause significant spalling, cracking, and breakage of the stones. In these cases it will be necessary to use diamond core drills to remove the ferrous pins. They will then need to be replaced with stainless steel pins.

More suitable materials are materials such as Jahn (distributed by Cathedral Stone) or the lime-based mortars of U.S. Heritage. These closely resemble the natural strength of the original stone, contain no synthetic polymers, exhibit good adhesion, and can be color matched if necessary.



Figure 56. Inappropriate use of setting compound to “reattach” the corner of this monument did nothing to deal with the more serious problem of the monuments instability – resulting in a significant liability to the church.

After many such repairs it will be necessary to fill the voids with a natural cementitious composite stone material resembling the original as closely as possible in texture, color, porosity, and strength. This type of repair may be used to fill gaps or losses in marble and is often used to help slow scaling of bedded sandstone exposed to the elements.

Under no circumstances should latex or acrylic modified materials be used in composite stone repair. These additives may help the workability of the product, but they have the potential to cause long-term problems. Such products are not appropriately matched in terms of strength or vapor permeability.

All infill work should be conducted by a trained conservator. The Jahn products, in fact, require certification in their use through Cathedral Stone. U.S. Heritage has likewise recently begun offering certification classes.

There are a several failing box tombs. Some pose an imminent hazard to the public. Support of ledgers is often undermined, creating a significant potential that the ledger will be damaged – and this dramatically increases the cost of repair. Consequently, these ledgers should receive a relatively high priority for repair.

Many of the stones are seriously leaning. When this occurs to headstones, the tilt may be sufficient to precipitate a ground break,

Table 4.
Comparison of Different Cleaning Techniques

Cleaning Technique	Potential Harm to Stone	Health/Safety Issues
Sand Blasting	Erodes stone; highly abrasive; will destroy detail and lettering over time.	Exposure to marble dust is a source of the fatal lung disease silicosis.
Pressure Washers	High pressure abrades stone. This can be exacerbated by inexperienced users. Pressures should not exceed 90 psi.	None, unless chemicals are added or high temperature water is used.
Acid Cleaning	Creates an unnatural surface on the stone; deposits iron compounds that will stain the stone; deposits soluble salts that damage the stone.	Acids are highly corrosive, requiring personal protective equipment under mandatory OSHA laws; may kill grass and surrounding vegetation.
Sodium Hypochlorite & Calcium Hypochlorite (household and swimming pool bleach)	Will form soluble salts, which will reappear as whitish efflorescence; can cause yellowing; some salts are acidic.	Respiratory irritant; can cause eye injury; strong oxidizer; can decompose to hazardous gasses.
Hydrogen Peroxide	Often causes distinctive reddish discolorations; will etch polished marble and limestone.	Severe skin and eye irritant.
Ammonium Hydroxide	Repeated use may lead to discoloration through precipitation of hydroxides.	Respiratory, skin, and eye irritant.
D/2 Architectural Antimicrobial	No known adverse effects, has been in use for nearly 10 years.	No special precautions required for use, handling, or storage.

dramatically increasing the cost of repair. For other monuments the tilt may be sufficient to cause the monument to fail and, in the process, there may be additional damage. We also observed monuments in the cemetery that had been improperly reset. In at least two cases the monument was reset in a manner that poses an additional hazard to the public – and a liability to the church (see Figure 56).

Monuments should never be reset using concrete, but rather should be set in pea gravel. This approach allows the stone some movement should it be accidentally impacted by lawn maintenance activities. The pea gravel will also promote drainage away from the stone, helping the stone resist the uptake of soluble salts.

A few stones require resetting in their still extant sockets. This, too, is a fairly simple procedure that can be accomplished with little time or funds, but which will minimize the potential for additional damage to the stone.

In such cases resetting involves the use of a high lime mortar mix. In this and all other areas of treatment, the church should avoid the use of Portland cement. It is entirely too hard for the stones and may contain impurities that will damage the stone through long-term exposure. More appropriate is a 1:2 mix of NHL 3.5 and sand. Epoxy and other adhesives should never be used since once set it is virtually impossible to remove the material. Even the use of

commercial setting compounds used by the monument industry should be limited to use on granite markers produced within the last 50 years.

As this suggests, there are a number of critical stone-related problems at the cemetery. While repairs are critical, they should not be conducted without adequate assessment, preparation of appropriate treatment proposals, and efforts to implement the preventative recommendations contained throughout this study. There is, for example, no benefit in expending treatment funds if issues such as vandalism and regulatory signage have not been addressed.

Cleaning of Monuments

A significant amount of damage may result from inappropriate cleaning techniques. The most common cleaning technique is the use of a bleach product – probably because bleach (either sodium hypochlorite or calcium hypochlorite) is widely available and inexpensive. We understand that bleach has been used in the cemetery. It is, however, unacceptable for historic monuments and its use should cease. Figure 57 shows an example of bleach spilled on a ledger and the resulting disfigurement.



Figure 57. Bleach spilled on this stone has caused a significant disfigurement.

Table 4 discusses problems with a variety of “common” stone cleaning processes widely used by commercial firms and the public. Providing this sort of information to families who have loved ones buried at the cemetery may help deter abusive cleaning.

Cleaning is largely an aesthetic issue at the cemetery – we saw few examples where soil or biologicals were actually causing damage to the monuments. Consequently, the church should embark on an educational program to discourage inappropriate cleaning – explaining not only the dangers of bleach and other commercial methods, but also pointing out that such activities diminish the historical value and

ambience of the cemetery. These cleaning methods remove not only soil, but also the patina of age – leaving monuments that no longer appear historic.

This educational program should point out that cleaning – even when done correctly – will gradually erode monuments, making them susceptible to more soiling and damage. Consequently, cleaning should be conducted no more frequently than perhaps once every 5 years.

The safest product for cleaning is simply low pressure (less than 90 psi) water and a soft bristle brush. When some other assistance is needed a product that has been found safe for most stones is D/2 Architectural Antimicrobial distributed by Cathedral Stone.

Brickwork and Repointing

Repairs should always begin with photographing the structure as it exists in order to completely document the original fabric and construction details. Only the unsound brickwork should be removed, stopping as soon as sound material is encountered. Repair should, as far as possible, use similar brick, mortar, joints, and tooling. Brick should match in size, hardness, texture, and color. Mortar should match the original in color, texture, and most importantly, strength.¹

¹ While historically appropriate mortars can be mixed, typically as a 1:3 ratio of either lime putty or NHL 2 or 3.5 with sand, recently prepackaged mixes have been marketed. These products may be superior when large jobs are undertaken, since they assure that the materials and mix are consistent. They are available from Virginia Lime Works (Mix-n-Go) and Cathedral Stone (Restomix).

Historic bricks are often far softer than modern examples. The use of a modern hard cement mortar will cause extensive damage to this soft brick as one expands more rapidly than the other. Mortar should always be designed to deteriorate more quickly (it should be sacrificial, meaning the use of high lime mortars) than the brick since it can be readily replaced through pointing.

All repointing should minimally meet or exceed the specifications established by *Preservation Briefs 2: Repointing Mortar Joints in*

Historic Masonry Buildings.

New mortar must conform to the following criteria: (1) it must match the historic mortar in color, texture, and tooling, (2) it must have greater vapor permeability and be softer than the masonry units, and (3) it must be as vapor permeable and as soft as the original mortar.

To achieve these criteria it may be necessary to have a conservator conduct a mortar analysis. It is also inappropriate to



Figure 58. Examples of masonry and concrete deterioration.

specify a single mortar, although in general the mortar should be high in lime and low in compressive strength. A natural hydraulic lime (NHL) or air lime would generally be specified for such work. For example, an air lime or NHL 3.5 might be mixed at the ratio of 0:1:3 (or 0:1:2) for much repointing work. The sand selection would be especially critical since that additive would primarily determine the final color (and texture) of the mortar.

Existing joints would need to be raked out to a depth 2.5 times their width. Thus, a 3/8-inch joint would need to be raked out to a minimum depth of 15/16-inch (typically expressed as 1-inch). The repointing mortar, generally mixed somewhat dry to minimize shrinkage and reduce cleaning efforts, would be firmly packed in the thoroughly cleaned and moistened joint using lifts no deeper than 1¼-inches.

The specifications are more detailed than this brief overview, but this should serve to indicate the level of care required for a cemetery having the historical significance of Christ Church.

Concrete Repair

Concrete has been extensively used both as monuments and as coping in some twentieth century cemeteries. Christ Church is no exception. Some of this concrete is in failure, or has already failed.

One of the most common – and clearly obvious – problems is spalling, crumbling, and complete failure. Careful examination reveals that the concrete exhibits no structural strength and crumbles. The deterioration may be related to the sulfates present in the mix. These sulfates react with the concrete to form gypsum which expands in the concrete and causes bowing, buckling, crumbling, or scaling of the concrete surface. Alternatively, the aggregate may have been sufficiently porous to encourage frost spalling.

In such cases the only remedy is to remove the concrete and replace it with an appropriate mixture.

There are basic procedures to be followed in concrete use, yet shortcuts are often taken that ultimately result in significantly compromised concrete. The durability of any concrete depends on the quality of the mix and workmanship involved in mixing, placing, compacting, and curing. For example, low permeability of finished concrete depends on the hydration of the cement to fill interstice voids that are initially filled with water. Keeping the newly cast concrete moist prevents the fresh concrete from drying too quickly and allows hydration to continue; this, in turn, promotes greater durability.

Concrete repair must be certain to match the historic material in finish, profile, and color. Aggregate should also match, assuming that the aggregate itself is not the cause of the deterioration. Concrete repair is typically well understood by most reputable contractors. It will consist of the removal of damaged sections to a minimum depth of 2-inches and that distance beyond the damage in all directions. The new surface will need to be roughened. It is often appropriate to install threaded fiberglass dowels to tie the new section of concrete to the old. In addition, the concrete will be coated with a bonding agent, such as Nitobond Epoxy Gel 400C. Often air-entrained concrete is used and this is acceptable, especially in areas with significant freeze-thaw action.

Ironwork Conservation

Although ironwork has been mentioned previously in the section on Fixtures and Furnishings, we are briefly reviewing critical issues here.

Every effort should be made to retain all existing ironwork, regardless of condition. Replacement with new materials is not only aesthetically inappropriate, but often causes

galvanic reactions between dissimilar metals. When some of the existing ironwork is incomplete, a reasonable preservation solution is to repair and maintain the remaining work rather than add historically inappropriate and incorrect substitutes. If replacement is desired, salvage of matching elements is preferred over recasting. Replication is typically not an appropriate choice since it is by far the most expensive course of action, and is often done so poorly.

The single best protection of ironwork is maintenance — and this revolves around painting. We have previously outlined specific steps and materials to use, focusing on minimal cleaning, followed by two coats of a rust converter and a final top coat of flat or semi-gloss alkyd paint.

Repair may include reattachment of elements. Ideally, repairs should be made in a manner consistent with original construction. For example, most newel posts were originally attached to a stone or masonry base using a threaded rod packed in lead. When this assembly is loose, the ideal approach is to replace the threaded rod with 316 stainless steel, and repack it using an epoxy filler (lead is rarely recommended both because of its health consequences and also because lead-iron contact promotes corrosion).

It may also be appropriate to use small stainless steel braces with stainless steel nuts and bolts to re-attach coping rails to posts. While welding is often expedient, this approach causes a radical change to the fence. Once welded, pieces are no longer able to move with expansion/contraction cycles, and this causes internal stresses that may lead to yet additional structural problems. Careful inspection of fences in good condition reveals that virtually all connections were “slip joints” — allowing the parts to expand and contract.

In addition, while wrought iron is easy to weld because of its low carbon content, cast

iron contains up to 4% carbon and is difficult to weld. Welding on cast iron should be done only by firms specializing in this work and capable of preheating the elements.

When used, welds should be continuous and ground smooth, in order to eliminate any gaps or crevices. When finished, it should be difficult to distinguish the weld — the original metal should blend or flow directly into the reattached part.

Another problem often observed in old cemeteries is the burial of the bottom fence rail in soil. In such cases moisture is held against the ironwork, promoting extensive corrosion.

When the fence is buried in the soil all that need be done is to resculpt the ground, lowering it below the bottom rail. This can not only resolve the corrosion problem, but can also promote better drainage away from the ironwork.

Much of the ironwork would also benefit from careful caulking of joints to prevent capillary uptake of moisture — which promotes corrosion in joints and other small crevices. An appropriate caulk is a premium-grade, high-performance, moisture-cured, single-component, polyurethane-based, non-sag elastomeric sealant (such as Sikaflex 1a). Silicone caulks should be avoided.

Another significant threat to the ironwork, however, is theft. Christ Church is exceedingly fortunate to have a small but diverse collection of ironwork — and several of the fences have original gates. All are attractive to thieves and the cemetery should take immediate action to harden these targets and discourage their theft.

Recommendations

We recommend that a stone-by-stone assessment be conducted of the cemetery. This will identify all monuments and fences in

need of treatment, determine their priority for treatment, and provide costs for that work to be accomplished. This is a critical planning function.

All work in the cemetery should be conducted by trained conservators who subscribe to the Code of Ethics and Standards of Practice of the American Institute for Conservation of Historic and Artistic Works (AIC). This should be the minimum level of competency required by the cemetery on all projects.

There are some treatments, such as resetting, creation of new sockets, cleaning, and some aspects of fence maintenance that can be undertaken by church staff with training and oversight.

MANAGING CEMETERY DATA

Existing Church Records

The primary church records are a series of hardcopy forms complied by a volunteer in 1972 (see Figure 59 for an example). These forms include basic information on the plot (is there an enclosure, what type of coping is present, how many monuments are present), a small not-to-scale sketch map, and hand written transcriptions of the stones. Unfortunately much of the writing, while readable, is faint and difficult to copy.

There is only one copy of these forms, stored in the church office. Although the forms are in fireproof filing cabinets and the church office is being fitted with automatic sprinklers, the forms themselves are on acidic paper and have a finite life under the best of circumstances.

About a decade ago the church converted most of its records to a computer database called UPTRENDS, produced by Uptrends Management Software. Founded in 1988, the firm ceased business in 2004, although its customer list was acquired by Tigerpaw Software, a firm specializing in customer relationship management software (<http://www.tigerpawsoftware.com/>).

The existing database is limited in functions and report capability. It also lacks a suitable mapping component. The church has been reluctant to shift to new software since it appears that

migration out of the existing program would be difficult. It is possible, however, that Tigerpaw Software could provide some assistance in the migration process, although since the firm does not offer a cemetery database, their commitment to assisting is uncertain.

There is at least one published list of graves (Whitmire 1976) using combined WPA data from 1936-1937 and Colonial Dames data

[illegible]

Figure 59. An example of the extant church records, compiled in 1972.

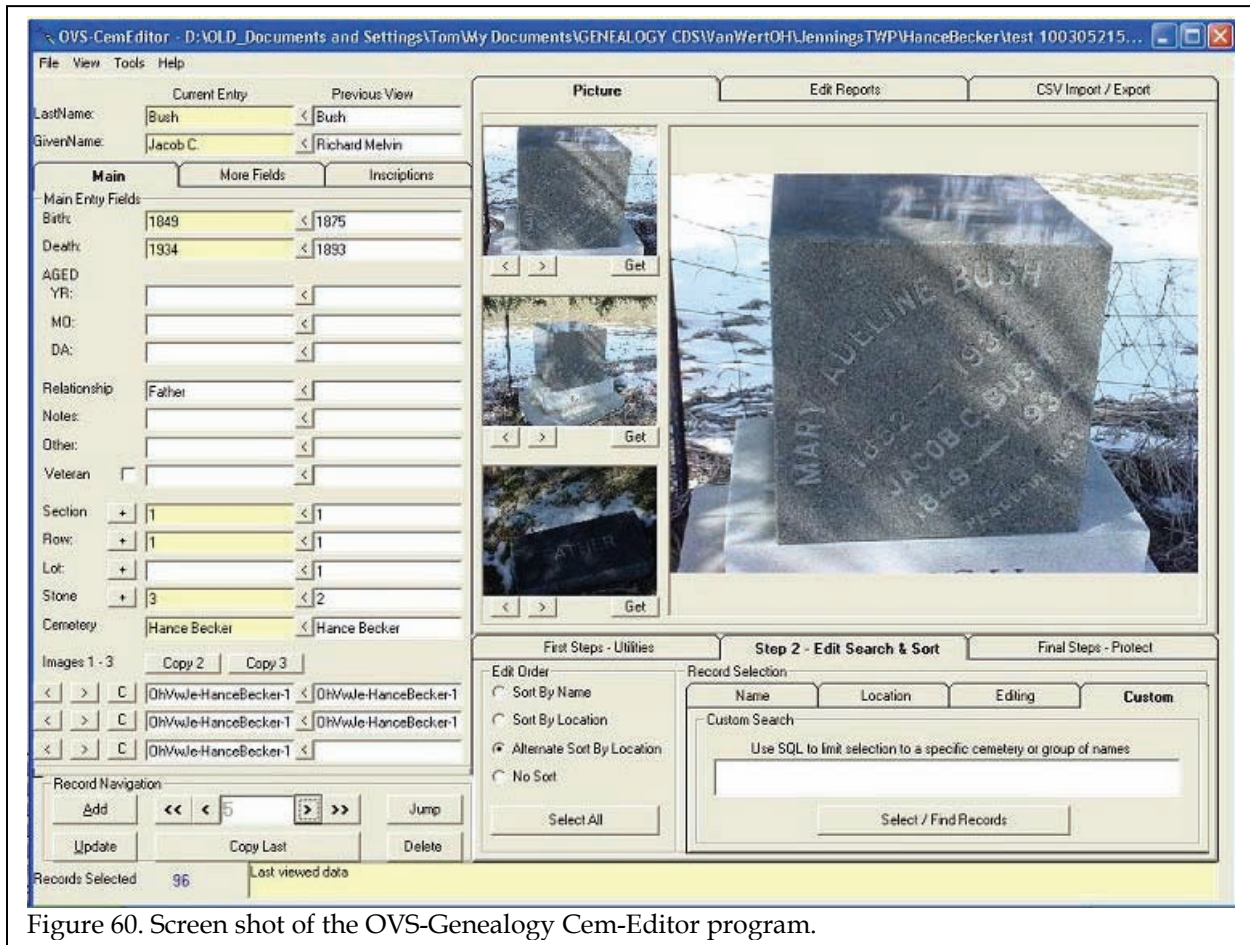


Figure 60. Screen shot of the OVS-Genealogy Cem-Editor program.

from 1958. Other sources may include obituaries from local papers and perhaps other church records.

The church should understand that database management programs are excellent for accessing data, but no program is intended to provide archival permanence. Thus, it would be appropriate to undertake two improvements.

First, the church should consider copying all of its current paper records and donating them to an archival facility that is capable of providing the security, climate, and disaster protection the records deserve. This would help ensure their long-term retention.

Second, although it would require considerable manual migration, we recommend that the church select a replacement database

software to ease daily management of the cemetery. Such software can also provide web access to the records by the public.

Data Presentation Options

How the data are presented depends on the goal of the presentation – what the church wishes to accomplish.

Simple Genealogical Presentation

Presentation of “who’s buried” in a particular cemetery need be no more complex than a Microsoft Excel spreadsheet converted to a webpage. While entirely lacking in frills, it has the potential to very quickly get basic information in a format that almost anyone with a computer can use. A simple example of this is available for the Chapel Hill Cemetery at

[http://townhall.townofchapelhill.org/facilities/](http://townhall.townofchapelhill.org/facilities/cemeteries/old_cemetery/search.asp)
[cemeteries/old_cemetery/search.asp](http://townhall.townofchapelhill.org/facilities/cemeteries/old_cemetery/search.asp).

The downside of such a site is that it is limited in information. For example, one of the most troubling aspects is that it fails to provide a complete transcription of the stone. Without a complete transcription much important data is lost or at least not accessible. Such a system also typically lacks the ability to post a photograph of the monument – and these visual graphics may provide critical information (especially with no complete transcription).

An alternative is to either develop a more comprehensive Microsoft Access database or to use a proprietary one, such as Cem-Editor from OVS-Genealogy (Figure 60). The Cem-Editor is based on Access, but the work of

condition information (once an assessment is complete), and custom fields for cemetery specific data. An add-on allows the data to be converted to web pages for publication. Another add-on allows the creation of very simple maps. This likely provides the quickest (and least expensive at less than \$150) route for the church to provide basic information and photography.

Cemetery Management Software

There are far more complex cemetery management software options, although the costs are considerably greater since the programs are designed for the commercial cemetery. Table 5 lists several of the more popular commercial products and some of their various capabilities.

Table 5.
Some Commercial Cemetery Management Software Programs

Name	Web Site	Price	Capabilities
Cemetery Management Max	www.cemeterydatabase.com/	Ca. \$1000.00	Full accounting, audit data entry with unparalleled sort & search of interred. Record companies your cemetery does business with, purchase and post transactions, protect data entry, view invoices, statements and account balances. Enter and view hundreds of types of data entry for Owners, Interred and Next of Kin. Include maps, automate Work Order entry, multiple family grave purchases, standard & amount protection deeds, all on-screen and by report.
CIMS eCIMS (allows on-line posting)	www.cimscemeterysoftware.com/	By proposal	CIMS™ links all of your cemetery data to actual computerized maps of your cemetery. This cemetery mapping allows access to data through map interaction and allows queries not possible with standard database tools.
Charon	www.charon.com.au/index.html	By proposal	A fully integrated suite of functions including Accounting & Financials, Records & Resource Management, Property Mapping, Web Applications, PDA Applications, Point of Sale, and Touch Screen Kiosks
HMIS	www.hmisinc.com/index.php	By proposal	Fully integrated cemetery, mortuary and crematory software solution.

design is already done. The program allows entry of complete transcriptions, photographs of the monument (perhaps combining a modern photograph with the historic photograph), brief

Since these products are intended for the commercial cemetery they typically have the ability to track trust or perpetual care funds. Most have the ability to produce checks,

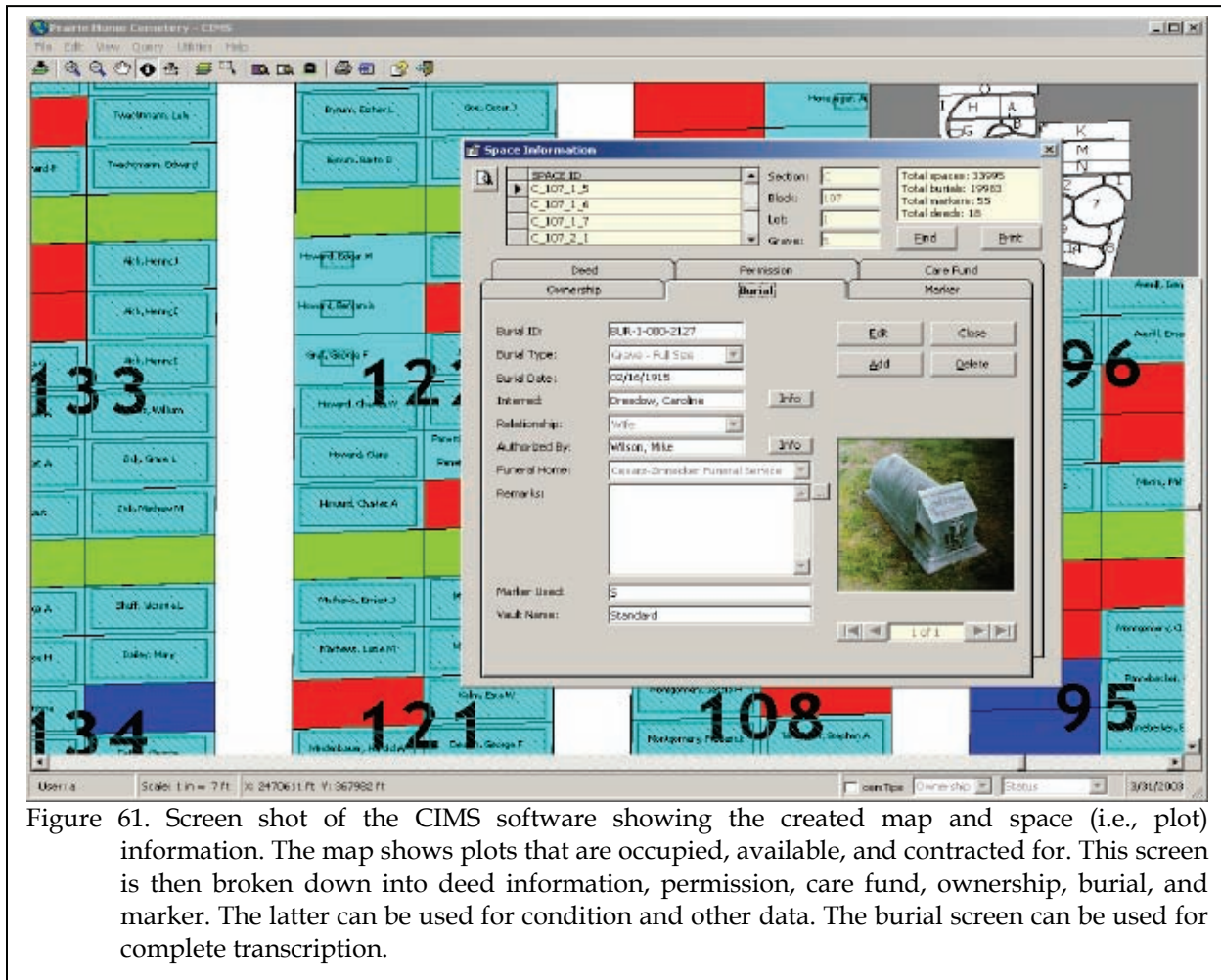


Figure 61. Screen shot of the CIMS software showing the created map and space (i.e., plot) information. The map shows plots that are occupied, available, and contracted for. This screen is then broken down into deed information, permission, care fund, ownership, burial, and marker. The latter can be used for condition and other data. The burial screen can be used for complete transcription.

providing a complete accounting system (which is unnecessary for Christ Church). Many have the ability to integrate a variety of services, including funeral director activities. As a result virtually all have capabilities that are in excess of what the church needs.

In fact, we understand that the church has examined at least some of these in the past and dismissed their use because of their complexity.

On the other hand, several of the companies provide turn-key work, taking maps, digitizing them and, if desired, integrating them with GIS databases. Several companies provide on-site instruction in the use of the programs. The church may also discover that one or more

of these companies can take the existing UPTRENDS data and integrate it into the new program.

There are certainly benefits to these programs and we are inclined to look at the eCIMS software as a potentially good choice. Designed for web-based access, the church could determine precisely the information it wishes to be on-line, as opposed to available on in-house computers (thus avoiding family privacy issues).

Although the CIMS Light provides many of the features appropriate to the management needs of Christ Church, including virtually all of the simple genealogical topics covered by Cem-Editor, it does not incorporate

interactive digital maps. This feature requires the more elaborate CIMS program.

Recommendations

It is critical that the church's data concerning its cemetery currently housed in the office as paper copies be transferred to a facility meeting modern archival standards. Minimally that would include controlled temperature and relative humidity, security detection, and fire detection and suppression. This should be done as soon as possible.

The existing database program is antiquated and fails to offer the report functions that are needed. We recommend steps be taken to replace the program, even recognizing that the existing data will likely need to be re-entered manually.

A simple, first step to provide public access through web access is a program such as Cem-Editor from OVS-Genealogy. This would fulfill the bulk of the church's immediate interests in a simple and cost-effective manner, allowing an immediate on-line presence.

In the long run, it is appropriate to consider cemetery management software. A system such as CIMS offers both business tracking capability as well as genealogical data access.

CHRIST CHURCH CEMETERY, GREENVILLE, S.C.

PRIORITIES AND FUNDING LEVELS

Recommended Priorities

Table 6 lists the recommendations offered throughout this assessment, classifying them by priority.

Priorities are identified here as First, Second, or Third:

First priorities are those we recommend undertaking during the current fiscal or calendar year. Some are issues that have the potential to affect the public health and safety and consequently require immediate attention. Most, however, are planning issues that require immediate attention to “set the stage” for future actions. We strongly believe that most cemetery projects fail through inadequate or inappropriate planning – thus, we recommend in the strongest possible terms that the church engage in the necessary planning to help ensure success.

Second priorities are those which should be budgeted for over the next 2 to 3 years. They represent urgent issues that, if ignored, will result in both significant and noticeable deterioration of the cemetery as an historic resource.

Third priorities are those that may be postponed for 3 to 5 years. They are issues that can wait for appropriations to build up to allow action. Some are

also less significant undertakings or actions that require other stages to be in place in order to make them feasible or likely to be successful. Because they are given this lower priority, however, they should not be dismissed as trivial or unimportant.

The costs are based on the best information available at this time. Some are derived from previous projects; others are determined using Means Site Work and Landscape Cost Data. All estimates are 2008\$. We recommend that local costs be evaluated since there may be significant differences. Many actions can be completed with the church’s own in-house staff; if these resources are not available as needed, then outside consultants should be retained.

It is important to realize that preservation costs must be continuous. The church cannot defer maintenance, hoping every few years to “catch up” on needed work. The cemetery must receive constant and on-going care and preservation efforts.

Actions recommended as critical and suggested for the current fiscal year have a cost of \$43,150. This includes three specific conservation related items: the repair of the mausoleum, maintenance of the columbarium area, and preparation of a stone-by-stone assessment. These three items have an estimated cost of \$38,000. Staff or a local contractor may be able to clean, repair, and wax the columbaria – this study provides recommendations. The examination of individual stones for the preparation of treatment proposals, however,

should be conducted by an AIC stone conservator. Similarly, the treatment of the mausoleum should also be undertaken by a stone conservator. This work, involving historic stone, is beyond the skill of local contractors.

Other first year recommendations include installation of appropriate signage, repair of the concrete sidewalks, securing loose ironwork, converting shaded areas to mulch, creating a fire ant control program, and installing anti-siphon devices on the cemetery water bibs. A variety of other actions are also recommended, but they are essentially administrative or policy issues, or involve minor changes in current activities.

Our phase two actions, intended to be carried out over the next 2-3 years, total \$112,800. While a very large figure, divided by three years, the cost is reduced to about \$37,600 – although this does not factor in inflation.

The most costly recommendation involves the repair of the roads – estimated to cost about \$60,000. During this second phase we also recommend that the fences in the cemetery receive treatment – minimally being painted. Another major Phase 2 undertaking will be the

professional pruning and care of the cemetery trees and shrubs.

Not included in this estimate is the cost of individual monument repairs. These costs will not be available until the stone-by-stone assessment is completed, but the cost is likely to exceed \$60,000 given the practice of deferred maintenance.

Third phase activities, to be carried out over the following three to five years, have a combined cost of \$114,500, although they too will be spread over several years.

The most expensive undertaking will be the rehabilitation of the turf – a process that will require several years, as well as access to water.

It is critical, however, to maintain momentum – there must be a perception of progress. It will be easier to raise funds if the congregation and visitors can see that work is being accomplished. Therefore, there may be wisdom in shifting some of the phase 2 conservation work to phase 1. Seeing stones reset, seeing three or four monuments repaired, is likely to encourage additional support from family members.

PRIORITIES AND FUNDING LEVELS

Table 6.
Prioritization of Recommendations

Priority	Recommendation	Budget
First – this fiscal or calendar year	1.1 All decisions regarding modifications, alterations, additions, or other actions affecting Christ Church Cemetery should be carefully evaluated against the Secretary of the Interior's Standards for Preservation.	n/c
	1.2 The historic fabric and context – especially of the older sections (sections I-IV) should be protected. No modifications should be allowed in this area since it affects the cemetery's historic core.	n/c
	1.3 Much of the cemetery's character derives from the evidence of three primary cemetery designs – traditional churchyard, rural cemetery, and lawn park. These elements have particular importance and should be closely guarded.	n/c
	1.4 The rear entrance (off Broadus Avenue) should be closed except for service traffic or for special needs.	n/c
	1.5 Concrete pathways exhibit several areas of significant deterioration. Uplifting or sinking is observed, as well as extensive cracking and failure. This work must match the original walkway in composition, design, color, and texture. Other pathways exhibit fewer problems, but should be periodically inspected.	\$1,500
	1.6 The church should develop a policy for identifying, reporting, and responding to damage, vandalism, and theft within the cemetery.	n/c
	1.7 The church should work to ensure that there are routine police patrols through the cemetery. These should occur at least once per night, with special attention paid to weekends.	n/c
	1.8 The church or a volunteer group should arrange to supplement police patrols to keep an increased eye on the cemetery.	n/c
	1.9 The maintenance staff should walk through the cemetery daily to review conditions. Landscape crews should also be trained to look for evidence of theft or vandalism.	n/c
	1.10 Plots should be evaluated for theft potential. Items should be secured as appropriate.	\$500
	1.11 All plot gates and loose ironwork in the cemetery should be secured using woven stainless steel wire, attaching the gate to its hinge post.	\$1,500
	1.12 Loose ironwork should be collected and either secured in the plot or cataloged and stored off-site.	n/c
	1.13 The mausoleum in the cemetery has mistakenly had an inappropriate, non-breathable coating applied. This is now causing problems as moisture attempts to escape. The coating needs to be removed. The underlying stucco should be repaired as necessary and the mausoleum should have either a colored whitewash or a mineral based paint applied.	\$15,000

CHRIST CHURCH CEMETERY, GREENVILLE, S.C.

Table 6, cont.
Prioritization of Recommendations

Priority	Recommendation	Budget
First - this fiscal or calendar year, cont.	1.14 The columbarium evidences extensive bronze disease with salt efflorescence. We also note that hardware is missing from many crypts and on others there is incorrect hardware that is causing additional corrosion. This will require a major maintenance program and the church should plan on yearly retreatment.	\$12,000
	1.15 The trees in the cemetery exhibit a variety of maintenance issues, including pruning needs, inappropriate planting techniques, under or over mulching, and inappropriate placement. These problems are likely the result of either deferred maintenance or the use of individuals with inadequate training and expertise. Only ISA Certified Arborists should be responsible for tree pruning. Routine maintenance activities should be undertaken by individuals who have appropriate training.	n/c
	1.16 We recommend that the church establish a policy that prohibits or limits lot plantings. When permitted they should be suitable for the plot and historically appropriate.	n/c
	1.17 Heavily shaded areas should be taken out of turf and mulched instead. Care must, however, be taken to ensure that the mulch does not exceed 3-inches in depth.	\$1,200
	1.18 The cemetery should ensure that pests such as fire ants are controlled. Other pests should be identified and controlled, if necessary.	\$300
	1.19 Anti-siphon devices (vacuum breakers) should be installed on all hose bibs throughout the cemetery.	\$150
	1.20 The church should develop and install identification and regulatory signage for the cemetery. This signage should minimally deal with proper care of the monuments, prohibit rubbings and warn visitors of their fragile condition; it should prohibit certain behaviors and actions, such as use of alcoholic beverages; it should establish simple guidelines for plantings, as well as the placement and removal of floral and grave decorations; and it should include contact and emergency information. The signage should be designed to be uniform and consistent with other signage already being used.	\$3,000
	1.21 The cemetery should establish flower regulations for its cemetery that maintains the dignity of the cemetery and allows reasonable maintenance. We recommend that all floral displays be either in a vase integrated into the flush marker or use a flower holder. Either will allow more appropriate maintenance. Seasonal displays should be removed immediately after the holiday; plants should be removed immediately once wilted. The church should consider limiting flowers on graves to a maximum of 10 days.	n/c
	1.22 The cemetery exhibits a scatter of trash that suggests the landscape crews are not adequately proactive in collecting litter.	n/c

PRIORITIES AND FUNDING LEVELS

Table 6, cont.
Prioritization of Recommendations

Priority	Recommendation	Budget
First - this fiscal or calendar year, cont.	1.23 There is evidence of alcoholic beverages being taken into the cemetery. Given the vandalism problems, steps should be taken to control this practice. We recommend signage prohibit alcohol on site and also that the church encourage the Greenville police to take a more proactive approach to this concern.	n/c
	1.24 We recommend that a stone-by-stone assessment be conducted of the cemetery. This will identify all monuments and fences in need of treatment, determine their priority for treatment, and provide costs for that work to be accomplished. This is a critical planning function.	\$8,000
	1.25 All work in the cemetery should be conducted by trained conservators who subscribe to the Code of Ethics and Standards of Practice of the American Institute for Conservation of Historic and Artistic Works (AIC). This should be the minimum level of competency required by the cemetery on all projects.	n/c
	1.26 It is critical that the church's data (or good quality copies) concerning its cemetery currently housed in the office as paper copies be transferred to a facility meeting modern archival standards. Minimally that would include controlled temperature and relative humidity, security detection, and fire detection and suppression. This should be done as soon as possible.	n/c

CHRIST CHURCH CEMETERY, GREENVILLE, S.C.

Table 6, cont.
Prioritization of Recommendations

Priority	Recommendation	Budget
Second – over next 2 to 3 years	2.1 The roads within the cemetery exhibit significant deterioration and the church should budget for their repair or rehabilitation.	\$60,000
	2.2 An effort should be made to identify short-term parking for cemetery visitors. This may be achieved by reducing the number of handicapped parking spaces. Alternatively, parking may be provided in one of the several church parking lots. In either event, the public should have adequate notice of parking availability.	n/c
	2.3 Several curbs require repair, involving the cutting out and replacement of the curbing. This work must match the original curbing in composition, design, color, and texture. The original profile should also be duplicated.	\$1,500
	2.4 The below ground drains in the cemetery should be mapped and their condition evaluated through video inspection. Repairs, if necessary, should be made to ensure their proper function.	\$4,000
	2.5 Drains should be cleaned on a yearly basis to remove soil and leaves. The cemetery should ensure that landscape maintenance crews do not blow leaves or other debris into the drains.	\$2,000
	2.6 The church should immediately implement – or fund – a maintenance program for the iron work in the cemetery. This program should consist – minimally – of cleaning and painting all of the ironwork.	\$10,000
	2.7 Ironwork repair is very exacting and we recommend that the fences be evaluated on a plot-by-plot basis, with the development of specific treatment plans for each.	\$5,000
	2.8 There are benches throughout the cemetery that require maintenance or replacement. The church should consider the wisdom of placing benches in this urban setting. It is also important that the church devise a policy regarding such landscape additions since they affect the overall integrity of the historic site.	n/c
	2.9 Whether contracted out or conducted in-house, the church should ensure that there is adequate staff to maintain the cemetery. If the work is done in-house we recommend a full-time staff of a “hands-on” supervisor and two technicians. Their efforts should be devoted exclusively to the cemetery. These individuals should be, at the time of their employment or within the first year, certified by PLANET (or a similar organization) in the fields of Landscape Technician – Exterior, Turfgrass Professional, or Ornamental Landscape Professional.	
	2.10 The church should work to ensure of continuity of the staff by providing appropriate pay levels, fringe benefits, and educational opportunities.	

PRIORITIES AND FUNDING LEVELS

Table 6, cont.
Prioritization of Recommendations

Priority	Recommendation	Budget
Second – over next 2 to 3 years, cont.	2.11 We recommend that only 20-22 inch power mowers be used in the cemetery. The equipment should be fitted with closed cell bumpers. In the past monuments have been damaged by the operation of mowing equipment; the church must take a much more proactive stance to supervise maintenance activities.	n/c
	2.12 Nylon trimmer line used in the cemetery should be no thicker than .065-inch. Technicians should be trained to avoid damaging stones while using this equipment.	n/c
	2.13 Soil analysis should be conducted to determine if adjustments are necessary for the turfgrass, shrubbery, or trees. Only organic fertilizers should be used to minimize damage to the stones.	\$300
	2.14 Tree selection within the cemetery should be focused on historically appropriate species, based on replication of identified historic trees in the cemetery or using period lists. Species should, however, be evaluated to eliminate those with problems such as suckers, surface roots, inherent weakness, etc. The cemetery should develop a tree plan to ensure that when any tree must be removed, an appropriate replacement is planted in its place.	\$1,200
	2.15 Trees within the cemetery should be fertilized on a routine basis and should be professionally evaluated and pruned at least once every 5 years by an ISA Certified Arborist. Trees should be inspected yearly and after any storm with winds in excess of 55 mph.	\$15,000
	2.16 The cemetery shrubbery is in particularly poor condition, evidencing years of neglect and/or inappropriate pruning. There is much deadwood, especially in the boxwoods. Much of the shrubbery requires renewal pruning. We recommend that if the church cannot devote trained staff to care for these issues that they let a contract specific for the renewal and rehabilitation of the shrubbery on the cemetery property.	\$8,000
	2.17 Graves and coping are sinking in different parts of the cemetery. The maintenance crews should begin a program to reset these items on a routine basis, perhaps checking the churchyard for problems once a year.	n/c
	2.18 There are some treatments, such as resetting, creation of new sockets, cleaning, and some aspects of fence maintenance that can be undertaken by church staff with training and oversight.	n/c
	2.19 The existing database program is antiquated and fails to offer the report functions that are needed. We recommend steps be taken to replace the program, even recognizing that the existing data will likely need to be re-entered manually.	n/c

CHRIST CHURCH CEMETERY, GREENVILLE, S.C.

Table 6, cont.
Prioritization of Recommendations

Priority	Recommendation	Budget
Second – over next 2 to 3 years, cont.	2.20 A simple, first step to provide public access through web access is a program such as Cem-Editor from OVS-Genealogy. This would fulfill the bulk of the church's immediate interests in a simple and cost-effective manner, allowing an immediate on-line presence.	\$5,800

PRIORITIES AND FUNDING LEVELS

Table 6, cont.
Prioritization of Recommendations

Priority	Recommendation	Budget
Third – over next 3 to 5 years	3.1 It would be useful to have an accurate survey of the cemetery and its various plots; until then the detailed aerial photography may help trace the use of the various sections.	\$35,000
	3.2 Understandably the existing histories of Christ Church have focused on the structure and the parish. What is needed is a careful analysis of the history of cemetery itself, tracing its formation and evolution, looking at where early burials are located, documenting the effects on the cemetery caused by various building expansions, and documenting the evolution of the various cemetery designs present.	\$7,500
	3.3 The local newspapers likely provide a rich resource concerning activities at the cemetery. These have not been adequately exploited and an effort is necessary to scan the papers for pertinent information.	\$2,500
	3.4 To improve access, the church should consider posting roads as one-way.	\$500
	3.5 Turf exhibits considerable stress. Factors include incorrect mowing practices (such as scalping), drought (and the failure to provide spot irrigation), and soil compaction. This has resulted in decline, with the increase in weeds and introduction of bermudagrass in the centipede areas. Renovation is necessary in a number of areas.	\$50,000
	3.6 Limited preemergent and postemergent weed control should be instituted at the cemetery, taking care to avoid stones. The herbicides will affect the stones and this work will need to be very carefully done to ensure that the stones are not damaged.	\$5,000
	3.7 The cemetery may wish to develop an interpretative brochure for visitors. Such a brochure should ensure broad interest and be relevant to a broad spectrum of the public by telling a compelling story. The cemetery should avoid appealing only to parishioners or only telling the stories of the rich and famous.	\$9,000
	3.8 In the long run, it is appropriate to consider cemetery management software. A system such as CIMs offers both business tracking capability as well as genealogical data access.	\$5,000

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SOURCES CITED

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- Atwood, Rosanne, Jeffrey Kelly, and Ellen Lipsey
1989 *The Boston Experience: A Manual for Historic Burying Grounds Preservation*. Second Edition. City of Boston, Boston Parks & Recreation Department, Boston.
- Building Conservation Technology
1981 *The Historic Resources of Greenville, South Carolina*. Building Conservation Technology, Nashville.
- Camp, Wallace J.
1975 *Soil Survey of Greenville County, South Carolina*. U.S.D.A., Soil Conservation Service, Washington, D.C.
- Huff, Archie Vernon, Jr.
1995 *Greenville: The History of the City and County in the South Carolina Piedmont*. University of South Carolina Press, Columbia.
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1934 *Written Historical and Descriptive Data - Christ Church, Greenville, South Carolina*. Historic American Building Survey, Washington, D.C.
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1962 *Modern Cemetery Management*. Catholic Cemeteries of the Archdiocese of Chicago, Chicago.
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1998 *A Cemetery Should Be Forever: The Challenge to Managers and Directors*. Tropico Press, Glendale, California.
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2001 *Purified by Fire: A History of Cremation in America*. University of California Press, Berkeley.
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1917 *What Trees and Shrubs Should We Plant in Cemeteries*. In *The Cemetery Hand Book: A Manual of Useful Information on Cemetery Development and Management*, Second Edition, pp. 356-358. Park and Cemetery Publishing Co., Madison, Wisconsin.
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1869 *Spring Grove Cemetery: Its History and Improvements with Observations on Ancient and Modern Places of Sepulture*. Robert Clarke & Co., Cincinnati.
- Trinkley, Michael and Debi Hacker
2006 *Preservation Assessment and Plan for Springwood Cemetery, City of Greenville, S.C.* Research Contribution 440. Chicora Foundation, Inc., Columbia.
- West, Myron H.
1917 *Establishing a Successful Cemetery Business*. In *The Cemetery Hand Book: A Manual of Useful Information on Cemetery*

Development and Management,
Second Edition, pp. 21-26. Park
and Cemetery Publishing Co.,
Madison, Wisconsin.

Whitmire, Beverly T., editor

1976 *The Presence of the Past: Epitaphs
of 18th and 19th Century Pioneers
in Greenville County, South
Carolina and Their Descendants.*
Gateway Press, Baltimore.

APPENDIX 1.

MICHAEL TRINKLEY

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Columbia, South Carolina 29202
803/787-6910

Education/Training

1974	B.A., Anthropology, University of South Carolina, Columbia
1976	M.A., Anthropology, University of North Carolina, Chapel Hill
1980	Ph.D., Anthropology, University of North Carolina, Chapel Hill
1997	Non-Destructive Investigative Techniques for Cultural Resource Management, NPS Workshop, Fort Scott National Historic Site, Fort Scott, Kansas (geophysical techniques)
1999	Jahn Installer Workshop, Cathedral Stone Products, Inc., Jessup, Maryland (3 days) (certified installer 9906811-SC)
2001	Preservation & Care of Brownstone Buildings, Technology & Conservation Conference, Boston, Massachusetts
2003	Lime Mortar Workshop, U.S. Heritage, Chicago, Illinois
2004	Preservation Masonry Workshop, School for the Building Arts, Charleston, SC (2 days)
2005	International Lime Conference, Orlando, Florida
2005	Edison Coatings Workshop, Richmond, Virginia (1 day)
2005	Historic Masonry Preservation Workshop, John Lambert, Campbell Center for Historic Preservation Studies, Mt. Carroll, Illinois (1 week)
2005	Preservation Masonry Workshop, College for the Building Arts, Charleston, SC (2 days)
2005	Masonry Analysis & Testing Workshop, Berkowitz and Jablonski, Campbell Center for Historic Preservation Studies, Mt. Carroll, Illinois (1 week)
2005	Jahn 4-Hour Workshop, Cathedral Stone Products, Columbia, SC

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2006	Stone Carving and Restoration Workshop, Traditional Building Skills Institute, Snow College, Ephraim, Utah (3 days)
2007	Integrally Colored Concrete Workshop, Ron Blank & Associates, AIA Continuing Education, Columbia, SC
2008	IACET Aerial Work Platforms Training; Supported Scaffold Safety Training; Cranes, Chains, Slings and Hoist Safety Training, Columbia, SC
2008	Georgia Urban Agriculture Council & UGA Cooperative Extension Outdoor Water Use Registration Program Certificate #P86X9G4467

Memberships

American Institute for Conservation of Historic and Artistic Works
US/ICOMOS – Brick, Masonry & Ceramics Committee
Association of Preservation Technology
Preservation Trades Network
National Trust for Historic Preservation
Association of Gravestone Studies

Abstract of Cemetery Conservation/Preservation Experience (not inclusive of legal/archaeological experience):

1992	Reviewer of National Trust for Historic Preservation publication on historic cemeteries publication by Lynette Strangstad.
1998-99	Principal Investigator, Survey and Documentation of African-American cemeteries in Petersburg, Virginia. Including mapping, grave location, and development of historic context. (with Preservation Consultants, Charleston, SC).
1998-99	Conservation activities, Maple Grove Cemetery, Maple Grove United Methodist Church, Waynesville, North Carolina.
1999	Instructor, Cemetery Preservation: Making Good Choices Workshop, Virginia Association of Museums, Petersburg, Virginia.
1999	Instructor, Cemetery Preservation: Making Good Choices Workshop, Georgia Local History Conference, Augusta, Georgia.
2000	Consultation regarding maintenance and clearing of Ricefield's Woodville Cemetery, Georgetown County, South Carolina.
2000	Invited Speaker, Cemetery Conservation Techniques, Historic Cemetery Preservation Workshop, Maryland Historical Trust, Annapolis, Maryland.
2000	Preservation assessment, Summerville Cemetery, Augusta, Georgia.

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2001	Assessment and preservation plan for Glenwood Cemetery, Thomaston, Georgia.
2001	Reconnaissance survey of cemeteries in Richland County, South Carolina.
2001	Preservation guidelines for St. Paul's Cemetery, Augusta, Georgia.
2001	Instructor, Cemetery Preservation: Making Good Choices Workshop, Restoration International Trade Event, New Orleans, La.
2001	Instructor, Cemetery Preservation: Making Good Choices Workshop, National Preservation Institute, Washington, D.C.
2002-2003	Conservation program, Old Waxhaws Presbyterian Cemetery, Lancaster County, South Carolina.
2003	Treatment of markers at the Vardeman Cemetery, Lincoln County, Kentucky.
2003	Consultation concerning cemetery walls and pathways, Maple Grove Cemetery, Waynesville, North Carolina.
2003	Invited Speaker, Preservation of African American Cemeteries Conference, 2003, Helena, Arkansas.
2003	Instructor, Cemetery Preservation: Making Good Choices Workshop, Washington County, Georgia Historical Society, Sandersville, Georgia.
2003	Preservation assessment, Old City Cemetery, Sandersville, Georgia
2003	Instructor, Cemetery Preservation: Making Good Choices Workshop, National Preservation Institute, Washington, D.C.
2003	Treatment of markers at Oakview and Riverside cemeteries; examination of burial vaults in white and African American sections, City of Albany, Georgia (FEMA funded).
2003	Preservation assessment, Historic Cemeteries at Five Cemeteries, Bannack State Park, Bannack, Montana
2003	Instructor, Cemetery Preservation: Making Good Choices Workshop, Bannack State Park, Bannack, Montana
2003	Consultation concerning cemetery brick wall, Midway Church, Midway, Georgia.
2004	Treatment of markers at Richardson Cemetery, Clarendon County, South Carolina.
2004	Instructor, Cemetery Preservation: Making Good Choices Workshop, National Preservation Institute, Washington, D.C.

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2004	Treatment of markers at Maple Grove Cemetery, Waynesville, North Carolina.
2004	Consultation regarding State Historical Marker, Roseville Cemetery, Florence County, South Carolina.
2004	Consultation regarding the Mary Musgrove Monument, Musgrove Mill State Park, Laurens County, South Carolina.
2004	Invited Speaker, Cemetery Preservation Workshop, SC Genealogical Society Annual Meeting, Walterboro, South Carolina.
2004	Treatment of markers at Wrightsboro Cemetery, Thomson, Georgia.
2005	Treatment of markers at Pon Pon Cemetery, Colleton County, South Carolina.
2005	Treatment of markers at Walnut Grove Plantation, Spartanburg County, South Carolina.
2005	Consultant on cemetery fence theft, Save Austin's Cemeteries, Austin, Texas.
2005	Treatment of markers at Richardson Cemetery (Second Phase), Clarendon County, South Carolina.
2005	Instructor, Cemetery Preservation: Making Good Choices Workshop, National Preservation Institute, Washington, D.C.
2005	Treatment of marker in Oakview Cemetery, Albany, Georgia.
2005	Treatment of markers at Trinity Cathedral, Columbia, SC.
2005	Preliminary preservation recommendations, Randolph Cemetery, Columbia, SC.
2005	Treatment of markers in Presbyterian Cemetery, Union, SC.
2005	Instructor, Cemetery Preservation: Making Good Choices Workshop, Save Oklahoma's Cemeteries, Muskogee, Oklahoma.
2005	Instructor, Cemetery Preservation: Making Good Choices Workshop, National Preservation Institute, Las Vegas, New Mexico.
2005	Treatment of marker, Reynolds Homestead, Critz, Virginia.
2005	Assessment and preservation plan for Lewis Cemetery, King and Queen County, Virginia. King and Queen County Historical Society.
2006	Treatment of markers in Presbyterian Cemetery, Union, SC (second phase).
2006	Assessment and preservation plan for Pine Lawn Memorial Gardens, Aiken, South Carolina. SC Department of Archives and History, Columbia.

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2006	Assessment of Unadilla Cemetery, Unadilla, Georgia.
2006	Invited Speaker, Planning a Cemetery Preservation Project, People and Places: South Carolina's Seventh Annual Statewide Historic Preservation Conference, SC Department of Archives and History, Columbia, South Carolina.
2006	Assessment and Preservation Plan, Memory Hill Cemetery, Milledgeville, Georgia.
2006	Assessment and Preservation Plan, Springwood Cemetery, City of Greenville & Friends of Springwood Cemetery, Greenville, South Carolina.
2006	Invited Speaker, Cemetery Rehab, South Carolina Landmark Conference, SC Department of Archives and History, Aiken, South Carolina.
2006	Assessment, Town of Dedham, MA cemetery, Vollmer Associates, Boston.
2006	Assessment and Preservation Plan, Naval Medical Cemetery Portsmouth Cemetery, Portsmouth, Virginia.
2006	Instructor, Cemetery Preservation: Making Good Choices Workshop, National Preservation Institute, Washington, D.C.
2006	Invited Speaker, Preservation Needs at Greenville's Springwood Cemetery, Greenville Chapter of SC Genealogical Society, Greenville, South Carolina.
2006	Preparation of landscape plan, Randolph Cemetery, Columbia, South Carolina.
2006	Treatment of markers in the Cason Plot, Long Creek Baptist Church, Warrenton, Georgia.
2006	Treatment of markers in the Watson Plot, Thomson City Cemetery, Thomson, Georgia.
2006	Treatment of markers at Trinity Cathedral, Columbia, South Carolina (second phase).
2006	Assessment and Preservation Plan, Old Athens Cemetery, University of Georgia, Athens, Georgia.
2006	Preparation of Treatment Plan, Terrell Tomb, Sparta, Georgia.
2006	Emergency conservation treatment, Settler's Cemetery, City of Charlotte, North Carolina.
2006-2007	Preservation Assessment and Recordation, St. Elizabeth's Cemetery, Washington, DC (for General Services Administration).
2006-2007	Preservation Assessment, three Raleigh Cemeteries, Raleigh, North Carolina.
2007	Historic research, Randolph Cemetery, Columbia, South Carolina.
2007	Treatment of Monuments at Laurelwood Cemetery, Rock Hill, South Carolina.

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2007	Assessment of markers, Machpelah Cemetery, Lincoln County, North Carolina.
2007	Assessment of Moss Family Cemetery, Stanly County, North Carolina.
2007	Treatment of Monuments at the Old Athens Cemetery, University of Georgia, Athens, Georgia.
2007	Treatment of markers at Trinity Cathedral, Columbia, South Carolina (third phase).
2007	Invited Speaker, Annual Conference of the South Carolina African American Heritage Commission, Mars Bluff, South Carolina.
2007	Instructor, Cemetery Preservation: Making Good Choices Workshop, National Preservation Institute, Greensboro, North Carolina.
2007	Treatment of markers at Machpelah Cemetery, Lincoln County, North Carolina.
2007	Assessment of markers, St. Johns Cemetery, Richmond, Virginia.
2007	Preservation Assessment, Village Cemetery, Newberry, South Carolina.
2007	Instructor, Cemetery Preservation: Making Good Choices Workshop, Lincolnton Historical Society, Lincolnton, North Carolina.
2007	Treatment of markers, Settler's Cemetery, Charlotte, North Carolina.
2007	Assessment of markers, Unitarian Church Cemetery, Charleston, South Carolina.
2007	Preparation of Conservation Scope of Work, Chalmette National Cemetery, Louisiana (for Lord, Aeck & Sargent, Ann Arbor, Michigan).
2007	Preservation Assessment and Assessment of markers, Mann Family Cemetery, North Attleboro, Massachusetts.
2007	Treatment of the Pringle Vault, City Cemetery, Sandersville, Georgia.
2007	Assessment of the Plunk Family Cemetery, Lincolnton, North Carolina.
2007	Assessment of City Cemetery, South Bend, Indiana.
2007	Assessment of Magnolia Cemetery, Mobile, Alabama.
2007	Treatment of the Middleton family vault, Middleton Plantation, Dorchester County, South Carolina.
2007	Treatment of ledgers in family cemetery, Augusta, Georgia.

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2007-2008	Treatment of markers at Richardson Cemetery, Clarendon County, South Carolina (third phase).
2008	Assessment of three city cemeteries, Thomasville, Georgia.
2008	Assessment of Cottage Cemetery, Augusta, Georgia.
2008	Assessment, South View Cemetery, Atlanta, Georgia.
2008	Treatment of Mitchem Family Cemetery stones, Clarendon County, South Carolina.
2008	Preparation of Conservation Scope of Work (brick, iron, stucco), Chalmette National Cemetery, Louisiana (for Lord, Aeck & Sargent, Ann Arbor, Michigan).
2008	Treatment of stones at Unitarian Church Cemetery, Charleston, South Carolina (first phase).
2008	Treatment of vandalized stone at Trinity Cathedral Church Cemetery, Columbia, South Carolina.
2008	Consultant, National Trust for Historic Preservation, Southern Field Office, Tornado damage at Oak View Cemetery, Atlanta, Georgia.
2008	Consultant, Dantzler Plantation, regarding brickwork, stucco, and rising damp, Holly Hill, South Carolina.
2008	Assessment, Christ Church Cemetery, Greenville, South Carolina.
2008	Treatment of stones at Magnolia Cemetery, Mobile, Alabama (first phase).
2008	Instructor, Cemetery Preservation: Making Good Choices Workshop, National Preservation Institute, Jacksonville, Florida.
2008	Treatment of Monuments at the Old Athens Cemetery, University of Georgia, Athens, Georgia (second phase).

National Register Nominations of Cemeteries

1999	Preliminary Multi-Property Nomination, African American Cemeteries of Petersburg, Virginia. Submitted to Virginia Department of Historic Resources, Richmond, Virginia (with Sarah Fick, Preservation Consultants).
2000	National Register Nomination, King Cemetery, Charleston County, South Carolina. Submitted to South Carolina State Historic Preservation Office, SC Department of Archives and History, Columbia.

CHRIST CHURCH CEMETERY, GREENVILLE, S.C.

- 2002 National Register Nomination, Scanlonville or Remley Point Cemetery, Charleston County, South Carolina. Submitted to South Carolina State Historic Preservation Office, SC Department of Archives and History, Columbia.
- 2005 Preliminary Information Form – Hopkins Family Cemetery, Richland County, South Carolina. Submitted to South Carolina State Historic Preservation Office, SC Department of Archives and History, Columbia.
- 2007 Preliminary Information Form – Harts Bluff African American Cemetery, Wadmalaw Island, Charleston County, South Carolina. Submitted to South Carolina State Historic Preservation Office, SC Department

APPENDIX 2.

1. General Requirements

- 1.1. All work will be performed in a professional and workmanlike manner by *experienced and well trained, uniformed* personnel, utilizing *clean, well-maintained equipment of the latest and most efficient design*.
- 1.2. The practices and procedures employed will be according to accepted industry standards (e.g., PLANET); installations and applications will be made with technical expertise; all vehicles and equipment will be operated both skillfully and safely within the cemetery grounds.
- 1.3. Work performance will comply with the Federal Occupational Safety and Health Act. All applications of pesticides classified for restricted use will be made by certified applicators only.
- 1.4. All original product packaging may be inspected by the cemetery's representative prior to use.
- 1.5. All mechanized equipment (power mowers, trimmers, edgers, etc.) must be turned off if you encounter the public (within 20 feet).
- 1.6. No mechanized equipment (power mowers, trimmer, edgers, etc.) may be used within 200 feet of a funeral in progress.
- 1.7. The Contractor will train crew members to respect not only the solemn dignity of the cemetery, avoiding loud talking, running, etc., but will also train all employees concerning the provisions of this agreement and the need to prevent damage to tombs, stones, and monuments.

2. Lawn Maintenance Issues

2.1. Mowing

- 2.1.1. Paper, trash, branches, flowers not associated with a grave, and other debris will be collected prior to each mowing.
- 2.1.2. Contractor will mow turf areas [as needed according to seasonal growth/on the following schedule: _____].
- 2.1.3. No more than 1/3 of the leaf blades will be removed per mowing - Contractor will be expected to adjust the mowing height as appropriate and, if necessary, for different sections of the cemetery. Mowing height will be according to grass type and variety per the following chart:

<u>Cool-season grasses</u>	<u>Mowing height</u>
Bluegrass	1½ - 2½ inches
Fescue, fine	1½ - 2½ inches
Fescue, tall	2 - 3 inches

Ryegrass, perennial 1 - 2 inches

Warm-season grasses	Mowing height
Bahiagrass	2 ½ - 4 inches
Bermuda grass, common	1½ - 2 inches
Bermudagrass, hybrid	1 - 1½ inches
Buffalograss	1½ - 2 inches
Centipedegrass	1½ - 2 inches
St. Augustine	3 - 4 inches
Zoysia	1 - 3 inches

2.1.4. During periods of excessive rain and tall grass growth, the mower cut height may be raised.

2.1.5. All mowing will be conducted with a [reel/rotary/mulching] mower. [Under no circumstance will any equipment larger than an intermediate walk-behind mower be used in the cemetery. / Given the spacing of stones and potential for damage, the largest acceptable equipment is a 21-inch push mower.]

2.1.6. Mower blades will be sharp at all times to provide a quality cut and prevent tearing of the grass blades.

2.1.7. Mowing equipment and patterns (alternate directions each cutting where possible) shall be employed to permit recycling of clippings were possible and present a neat appearance.

2.1.8. Contractor will leave clippings on the lawn as long as no *readily visible* clumps remain on the grass surface 36 hours after mowing. Otherwise, Contractor will distribute large clumps of clippings by mechanical blowing or by collecting and removing them. In the case of fungal disease outbreaks, Contractor will collect clippings until the disease is undetectable.

2.1.9. All plots with coping surrounding grass will require special treatment and consideration.

2.1.9.1. No coping is to be damaged by turf maintenance or removed to make maintenance "easier." Mowers may not be operating when passing over coping.

2.1.9.2. Only 21-inch push mowers may be used in plots with coping (see item 2.2.4.).

2.2. Edging and Trimming

2.2.1. Grass adjacent to fixed objects, such as tombs, grave stones, monuments, etc., shall be trimmed to the same height as the general turf. Trimming is to be done so that turf areas are not scalped.

2.2.2. Contractor will edge tree rings and plant beds, and all buildings, sidewalks, fences, driveways, parking lots, and other surfaced areas bordered by grass will be edged every other mowing during the growing season.

2.2.3. Turf around sprinkler heads will be trimmed or treated with a non-selective herbicide so as to not interfere with or intercept water output.

- 2.2.4. No mower will be operated within 12-inches of any marker, monument, headstone, footstone, or other memorial. All turf between these markers and mown areas must be trimmed using a filament line trimmer equipped with line no heavier than 0.065-inch.
- 2.2.4.1. The Contractor's employees will be expected to know the length of their trimmer line at all times to prevent this line from coming into contact with the grave stones, tombs, and monuments. Any line damage other than pre-existing (defined as documented by the Contractor at the beginning of this agreement) is the responsibility of the Contractor.
- 2.2.4.2. When trimming near stones, tombs, and monuments, the Contractor is responsible for ensuring that the rotation of the string causes the grass to be thrown back towards the operator. This will assist in preventing any objects thrown by the trimmer, such as rocks, sticks, etc., from being thrown toward fragile stones, thereby minimizing the potential for accidental damage.
- 2.2.4.3. The cemetery's stones will be trimmed every other mowing during the growing season.
- 2.2.5. Isolated trees and shrubs growing in lawn areas will require mulched areas around them (minimum 2-foot diameter, maximum 3-foot diameter) to avoid bark injury from mowers and filament line trimmers and to reduce root competition from grass. Establishment and maintenance of such mulched areas will be charged to the cemetery.
- 2.2.6. Contractor will clean all clippings from sidewalks, curbs, roadways and markers or monuments immediately after mowing and/or edging. Contractor will not sweep, blow or otherwise dispose of clippings in sewer drains.
- 2.2.7. Contractor will ensure that grass clippings do not build up in the corners of plots with coping - otherwise over time there is a build-up of unsightly dead grass in these areas.
- 2.2.8. Under no circumstance will herbicides be used in lieu of appropriate edging and trimming, especially adjacent to monuments and fences. Soil sterilants may never be used on the cemetery property.

2.3. Soil Testing

- 2.3.1. A number of soil tests will be performed to ensure correct care is being given to the turf.
- 2.3.2. The cemetery is to be provided with a written copy of all soil tests, along with the recommendations resulting from the test.

2.4. Fertilization

- 2.4.1. Contractor will fertilize turf areas as per the maintenance specifications attached.
- 2.4.2. Complete fertilizers shall be granular in composition and contain 30% to 50% or more of the nitrogen in a slow- or controlled-release form. The ratio of nitrogen to potash will approximate 1:1 or 2:1 for complete fertilizer formulations (Examples: 15-5-15, 16-4-8, 15-0-15, 12-2-14, 14-3-14). The exact composition of the fertilizer shall be determined on the basis of good industry practice combined with soil

testing (see item 2.3.). While nitrogen fertilization is based on the desired growth rate and type of turfgrass being grown, the phosphorus fertilization rate should be based on the analysis of a lawn soil sample and the recommendations obtained from it. The fertilizer shall also contain magnesium and micro-nutrients (i.e., manganese, iron, zinc, copper, etc.). Iron shall be in the sulfate, sucrate or chelated form.

- 2.4.3. Fertilizer will be swept off of walks and drives onto lawns or beds.
- 2.4.4. Fertilizer will be swept off all monuments, markers, headstones, footstones, and other memorials onto lawns or beds.
- 2.4.5. Since the cemetery has no means of watering in fertilizer, the Contractor will apply at the appropriate season and when rain is anticipated within 24 hours.

2.5. Aeration

- 2.5.1. Turfgrass areas in regions of clay and highly compacted soils require regular aeration. Aeration should be accomplished in the early spring or before soils freeze in late autumn in colder climates.
- 2.5.2. No equipment is to be operated within 12-inches of monuments, markers, or stones. Special care is to be taken around walkways, copings, and curbs. All sprinkler heads are to be flagged and avoided by aeration equipment.

2.6. Pest Control

- 2.6.1. The Contractor will inspect lawn areas each visit for indications of pest problems and advise the cemetery of such problems.
- 2.6.2. Upon confirmation of a specific problem requiring treatment, the Contractor will apply pesticides as needed and only in affected spots, whenever possible using the least toxic, effective pesticide. No pesticide will be applied to turf areas without the express approval of the client. This includes weed and feed formulations.
- 2.6.3. All applications of pesticides and fertilizations will be performed when temperatures are below 90°F and wind drift is negligible.
- 2.6.4. The Contractor will keep records on pests identified and treatment(s) rendered for control.
- 2.6.5. All pest control service is in addition to the basic contract charges. The Contractor will charge the client per job, based on materials cost plus labor. The cost will be agreed on by the cemetery and Contractor in writing before such service is rendered.
- 2.6.6. Pesticide applications will be made in accordance with the rules and regulations governing use of pesticides in [state]. The Contractor will post alerts at all entrances to the cemetery to notify pesticide-sensitive persons of the application as well as follow all laws or requirements of [state]. The pest control applicator will be operating under License # _____ with an expiration/renewal date of _____.

3. Landscape Plant Maintenance Issues: Trees, Shrubs, Ground Covers

3.1. Soil Testing

- 3.1.1.** A number of soil tests will be performed to ensure correct care is being given to the cemetery plantings.
- 3.1.2.** The cemetery is to be provided with a written copy of all soil tests, along with the recommendations resulting from the test.

3.2. Fertilization

- 3.2.1.** Ornamental shrubs, trees and ground covers planted less than 3 years shall be fertilized 4 to 6 weeks after planting and then two to three times per year for the following 3 years. Two of the annual applications are normally scheduled around March and September. A third application may be made during the summer. Rate will be 1 pound of nitrogen per 1,000 square feet per application.
- 3.2.2.** Fertilizers should contain equal amounts of nitrogen and potassium, and 30% or more of both elements should be available in slow-release form. The fertilizer should also contain magnesium and a complete micronutrient amendment. The fertilizer analysis shall be similar to 8-2-8, 15-5-15, 14-3-14, 12-2-14, etc.
- 3.2.3.** Fertilizer applied to shrubs and trees planted in beds shall be broadcasted over the entire plant bed. Fertilizer must be punched shallowly into the soil on berms and slopes where runoff is likely.
- 3.2.4.** Individual, established trees and shrubs will receive annual fertilization as appropriate. In general, evergreen trees should be given a high nitrogen fertilizer such as ammonium sulfate, 21-0-0; deciduous shrubs, especially flowering ones, require phosphorus; and broad leafed evergreens should be given a balanced fertilizer such as 10-10-10.
- 3.2.5.** Nutrient deficiencies shall be treated with supplemental applications of the specific lacking nutrient according to the local cooperative extension recommendations.

3.3. Pest Control

- 3.3.1.** Contractor shall practice Integrated Pest Management (IPM) to control insects, diseases and weeds on and around perennials, ground covers, shrubs, vines and trees. This will include frequent monitoring and spot treatment as necessary using the least toxic methods. All applications will be performed when temperatures are below 90°F and when wind drift is negligible. First choice will be insecticidal soaps, horticultural oils and biological controls such as *Bacillus thuringiensis* (Bt) formulations.
- 3.3.2.** Weeds in beds or mulched areas will usually be removed mechanically or by hand. Upon cemetery approval only, herbicides may be employed for heavy weed infestations. Should herbicides be approved, all necessary precautions (including, but not limited to application when there is no wind to cause drift and tenting or otherwise covering) must be taken to prevent herbicides from being applied to or landing on monuments, stones, or markers.

3.4. Pruning

- 3.4.1. Pruning should only be done to remove dead or diseased branches, reduce foliage density or crossing branches, to improve the beauty of the plant through selective removal of a few branches, or to ensure safety of monuments and visitors.
- 3.4.2. Shrubs will be pruned with hand shears as needed to provide an informal shape, fullness and blooms. No powered hedge trimmers are to be used in the cemetery.
- 3.4.3. All trees should be trimmed so a mower can get under and around them, with these exceptions: [_____].
- 3.4.4. No pruning will be done during or immediately following growth flushes, branches will be pruned just outside the branch collar, and pruning paint will not be applied.
- 3.4.5. Sucker growth will be removed by hand from the base of trees. No herbicides will be used for this purpose.
- 3.4.6. The Contractor will remove all litter from the cemetery.
- 3.4.7. The cemetery requires that any tree pruning be conducted only by an ISA Certified Arborist.

3.5. Mulching

- 3.5.1. All mulched areas will be replenished once a year during the winter months (Nov. - Feb).
- 3.5.2. Mulch should be maintained at a depth of not less than 2-inches and not more than 3-inches.
- 3.5.3. Mulch will not be placed against the trunks of plants.
- 3.5.4. Mulch will not be placed against marble or sandstone tombs, monuments, or gravestones.
- 3.5.5. Mulch will not be allowed to cover valve boxes, meters, irrigation heads, landscape lighting, or any stone, monument, or marker.
- 3.5.6. All curb, roadway and bed edges will be trenched to help contain the applied mulch. The Contractor is required to define all edges and taper or roll away the mulch from the edges.
- 3.5.7. The Contractor is responsible for remixing mulch in areas that are starting to show mold or rot and to ensure that mulch or other landscape bed materials are not mixing or creeping into turf areas.
- 3.5.8. Additional mulch will be billed at \$____ /yard.

4. General Maintenance

- 4.1. Monthly the Contractor will be responsible for manually pulling of any and all weeds in landscape beds (barked, stoned, and flower beds, including family plots), around curbs and coping, sidewalks, parking areas, and around trees that are barked or landscaped, fence lines, retaining walls, property lines – anywhere that weeds are growing.
- 4.2. Monthly the Contractor will be responsible for removing all trash from bed areas and other high visibility areas, including walkways, parking lots, and family plots.

- 4.3. All turf areas and planting beds (including shrubbery and planting areas) will be cleaned of leaves, weeds, trash, and any other winter debris during the first visit in the Spring [or in (month)] and Fall [or in (month)].

5. Optional Service Issues

- 5.1. All optional services will be by supplemental written agreement of the cemetery and that agreement will specify the extent and cost of the proposed work. All such work, however, will satisfy these general requirements.

5.2. Annual Flowers

- 5.2.1. All annuals will be protected from the wind during transportation; no flats will be stacked on one another; no plants will be used that have been damaged. All annuals will be watered and no more than can be planted will be depotted.
- 5.2.2. The cemetery will approve all spacing of annuals in writing prior to their planting.
- 5.2.3. Replacement of existing annuals will be done ____ times per year. Major renovation of annual beds shall be accomplished once per year in ____.
- 5.2.4. Replacement of dead or injured plants (material that is 25% dead or more shall be considered dead) due to pests or Contractor negligence will be done without cost to client.
- 5.2.5. Replacement of stolen, vandalized or damaged flowers will be charged to the client at a rate of \$____ / plant.
- 5.2.6. Annuals and perennial bedding plants shall be fertilized monthly, at a rate of ½ pound of nitrogen per 1,000 square feet of area every 3-4 weeks. An optional fertilizer schedule would use a slow-release fertilizer such as Osmocote or Nutricote incorporated in the bed at planting, and applied thereafter according to label directions.
- 5.2.7. The Contractor will be responsible for weed control (see 2.2.2). Pest control will follow IPM principles (see 1.4.).

5.3. Irrigation System Work

- 5.3.1. The Contractor may be required to inspect and test rain shut-off devices and other components and zones in the irrigation system monthly and shall reset zone times according to seasonal evapotranspiration changes.
- 5.3.2. Minor adjustments and repairs such as head/emitter cleaning or replacement, filter cleaning, small leaks, and minor timer adjustments shall be made by the Contractor, with the client paying for parts.
- 5.3.3. Once a year, the Contractor will recalibrate each zone to allow for the application of ½ inch - ¾ inch of water per irrigation.
- 5.3.4. During weekly maintenance, the Contractor will note and report to client any symptoms of inadequate or excessive irrigation, drainage problems, etc.

5.3.5. If the Contractor is responsible for irrigation scheduling, timers will be shut off during the summer rainy season and the system will be turned on manually as needed.

5.3.6. Repairs or system service beyond the above scope will be charged to the client at an hourly rate per worker plus parts. The Contractor will notify the cemetery of the nature of the problem before repairs are made.

6. Inspection and Acceptance of Work

6.1. The Contractor shall be responsible for notifying the cemetery's representative as soon as practical after all work.

6.2. An inspection will be made by the cemetery's representative within 24 hours of notification by the Contractor that work has been performed.

6.3. The cemetery will notify the Contractor, in writing, of any work that is not deemed acceptable. The Contractor will have 72 hours to repair, replace, or redo the specified work. Any damage to monuments, markers, memorials, or fences will require professional conservation treatment by a conservator who is a member of the American Institute for Conservation of Historic and Artistic Works and who is approved by the cemetery. The Contractor will be responsible for all charges incurred.

6.4. All work must meet the specifications of this agreement. The cemetery's representative will be the final authority on acceptance, as well as any damage to cemetery property, markers, monuments, fences, etc.

7. Insurance, Licenses, Permits, and Liability

7.1. The Contractor will carry liability amounts and worker's compensation coverage required by law on his/her operators and employees and require the same of any sub-Contractors and provide proof of same to the cemetery.

7.2. The Contractor will carry general liability insurance in the amount of \$1,000,000.

7.3. The Contractor is also responsible for obtaining any licenses and/or permits (not limited to business licenses, pesticide licenses, etc.) required by law for activities on cemetery's property.

7.4. All work will be performed in a workmanship-like manner.

7.5. Situations which the Contractor may deem are his/her responsibility:

7.5.1. Any damage due to the operation of his equipment in performing the contract, to include damage to stones, monuments, markers, fences, walkways, curbs, coping, plantings, or any memorial device in the cemetery.

- 7.5.2. Failure to comply with all laws pertaining to protected plant species.
- 7.5.3. Damage to plant material due to improper horticultural practices.
- 7.5.4. Improper replacement or retrofitting of irrigation system components.
- 7.5.5. Injury to nontarget organisms due to application of pesticides.
- 7.5.6. Any pollution to the cemetery or its groundwater caused by waste oil, herbicides, or pesticides used by the Contractor.

7.6. Situations which the Contractor may deem are not his/her responsibility:

- 7.6.1. Death or decline of plant materials due to improper selection, placement, planting or maintenance done before the time of this contract.
- 7.6.2. Damage due to improper irrigation components existing at the time of contract execution.
- 7.6.3. Exposed cables/wires or sprinkler components/lines normally found below the lawn's surface.
- 7.6.4. Flooding, storm, wind, fire or cold damages.
- 7.6.5. Disease or damage to lawns or landscape plants caused by excessive irrigation or lack of water due to inoperative irrigation components provided he/she reported these to client, or irrigation restrictions imposed by civil authorities.
- 7.6.6. Damage caused by or to any item hidden in the landscape and not clearly guarded or marked, excluding however, all stones, monuments, markers, fences, walkways, curbs, coping, or memorial devices.
- 7.6.7. Damage due to vandalism.

8. Property Description, Services Provided, Terms, Conditions, and Charges

- 8.1. This contract is for the maintenance of property at _____,
_____, _____ and more specifically described as:

- 8.2. The contract term is for a period of 1-year with a beginning date of _____ and an ending date of _____. The contract may be canceled by either party without cause with 30-days written notification. Upon such cancellation the Contractor remains responsible for any damages as outlined in 7.5.

- 8.3. This contract will be governed by the laws of [state]. Should the cemetery be required to engage the services of an attorney in connection with this agreement or to enforce its provisions, the cemetery shall be entitled to reasonable attorney's fees.

8.4. Charges.

- 8.4.1. The Contractor will furnish all labor and equipment for the performance of this contract.

CHRIST CHURCH CEMETERY, GREENVILLE, S.C.

8.4.2. The charge for the specified service shall be \$_____ per year payable [as a lump sum at the initiation of the agreement / on a monthly basis of \$_____ / or other].

8.5. Any additional or unscheduled services agreed upon by the cemetery and Contractor will be billed separately as net 30 days.

Name of Cemetery	Name of Firm
Cemetery's Representative	Contractor's Representative
Typed Name	Typed Name
Title	Title
Date	Date

Typical Basic Fertilization Guide – Adjust for your specific area and needs

Grass	J	F	M	A	M	J	J	A	S	O	N	D
Annual Zoysiagrass			C		SRN				C			
Annual Bermudagrass			C		SRN				C			
Annual Centipedegrass				C								
Annuual St. Augustinegrass			C			Fe			C			
Annual Bahiagrass			C					C				

C=complete fertilizer application (NPK); SRN=nitrogen only in a slow release from; Fe=iron application only

APPENDIX 3. EXAMPLES OF APPROPRIATE TREATMENT PROPOSALS FOR VANDALIZED MARKERS

Monument Treatment Proposal

Section:

Plot: 1

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☒ die on base ☐ tab in socket ☐ box ☐ other:

Existing Condition

Position: ☒ fallen ☐ tilted ☐ unstable ☐ unattached/loose ☐ missing

Deterioration: ☐ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☐ partial 25-50% ☐ minimal <25% ☒ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☒ biological ☐ staining ☐ efflorescence ☐ other:

Treatment Strategy

Position: ☐ reset/level in ground ☒ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☒ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

Treatment: ☐ core drill ☒ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☐ other:

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 1

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: **\$850** (not including travel, per diem & lodging)



APPENDIX 3.

Monument Treatment Proposal

Section:

Plot: 2

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☒ die on base ☐ tab in socket ☐ box ☒ other: with pins

Existing Condition

Position: ☒ fallen ☐ tilted ☐ unstable ☐ unattached/loose ☐ missing

Deterioration: ☐ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☐ partial 25-50% ☐ minimal <25% ☒ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☐ mortar ☒ other: pins

Soiling: ☒ biological ☐ staining ☐ efflorescence ☒ other: atmospheric staining

Treatment Strategy

Position: ☐ reset/level in ground ☒ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☐ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

Treatment: ☒ core drill ☐ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☒ other: remove pins if ferrous and replace with 316 stainless; reset if brass

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 2

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in
5-10 years; 5) irreparable

Cost: \$400-\$900 (not including travel, per diem & lodging)



Monument Treatment Proposal

Section:

Plot: 3

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☒ die on base ☐ tab in socket ☐ box ☐ other:

Existing Condition

Position: ☒ fallen ☐ tilted ☐ unstable ☐ unattached/loose ☐ missing

Deterioration: ☐ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☐ partial 25-50% ☐ minimal <25% ☒ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☐ mortar ☒ other: pins

Soiling: ☒ biological ☐ staining ☐ efflorescence ☒ other: atmospheric staining

Treatment Strategy

Position: ☐ reset/level in ground ☒ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☐ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

Treatment: ☒ core drill ☐ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☒ other: remove pins if ferrous and replace with 316 stainless; reset if brass

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 2

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
 3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: \$1,050 (not including travel, per diem & lodging)



APPENDIX 3.

Monument Treatment Proposal

Section:

Plot: 4

Name: Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☐ die on base ☐ tab in socket ☒ box ☐ other:

Existing Condition

Position: ☐ fallen ☐ tilted ☒ unstable ☒ unattached/loose ☐ missing

Deterioration: ☒ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☒ partial 25-50% ☐ minimal <25% ☐ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☒ biological ☐ staining ☐ efflorescence ☒ other: atmospheric staining

Treatment Strategy

Position: ☐ reset/level in ground ☐ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☐ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

Treatment: ☐ core drill ☒ drill and pin ☐ simple adhesive repair ☒ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☒ other: create internal supports for damaged side panels; infill with Jahn M120

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 1

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: \$1,950 (not including travel, per diem & lodging)



Monument Treatment Proposal

Section:

Plot: 5

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☐ die on base ☐ tab in socket ☐ box ☒ other: pedestal tomb

Position: ☒ fallen ☐ tilted ☐ unstable ☐ unattached/loose ☐ missing

Existing Condition

Deterioration: ☐ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☐ partial 25-50% ☐ minimal <25% ☒ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☒ biological ☐ staining ☐ efflorescence ☐ other:

Treatment Strategy

Position: ☐ reset/level in ground ☒ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☒ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

Treatment: ☐ core drill ☒ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☐ other:

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 2

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: **\$850** (not including travel, per diem & lodging)



APPENDIX 3.

Monument Treatment Proposal

Section:

Plot: 6

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☐ die on base ☒ tab in socket ☐ box ☐ other:

Existing Condition

Position: ☒ fallen ☐ tilted ☐ unstable ☐ unattached/loose ☐ missing

Deterioration: ☒ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☒ extensive >50% ☐ partial 25-50% ☐ minimal <25% ☐ not applicable

Failed/Old Treatments: ☐ metal ☒ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☒ biological ☐ staining ☐ efflorescence ☒ other: atmospheric staining

Treatment Strategy

Position: ☒ reset/level in ground ☐ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☒ stabilize foundation ☒ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☒ hand tools ☐ solvents ☐ other:

Treatment: ☐ core drill ☒ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☐ other: infill losses with Jahn M120

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 2

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: **\$1,200** (not including travel, per diem & lodging)



Monument Treatment Proposal

Section:

Plot: 7

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☒ die on base ☐ tab in socket ☐ box ☒ other: head of cradle

Existing Condition

Position: ☒ fallen ☐ tilted ☐ unstable ☐ unattached/loose ☐ missing

Deterioration: ☐ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☒ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☐ partial 25-50% ☒ minimal <25% ☐ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☒ biological ☐ staining ☐ efflorescence ☒ other: atmospheric staining

Treatment Strategy

Position: ☐ reset/level in ground ☒ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☒ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

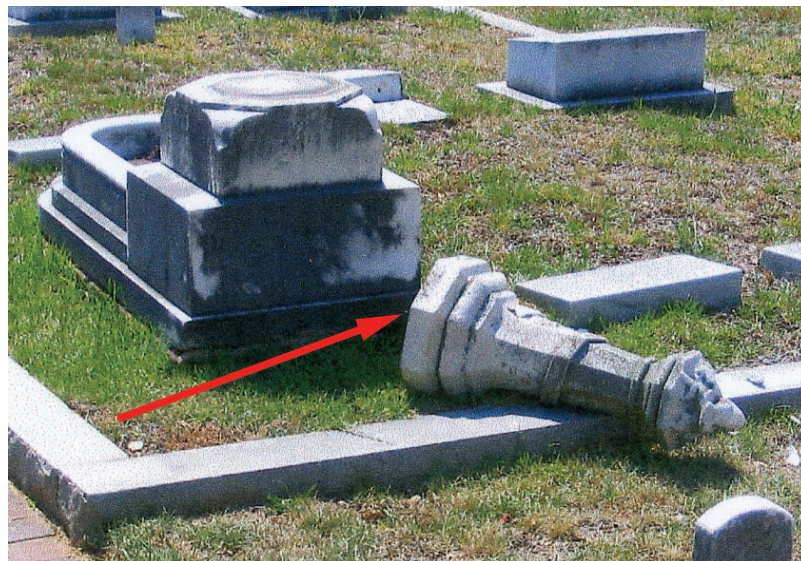
Treatment: ☒ core drill ☒ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☒ other: examine remaining bases for ferrous pins

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 2

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in
5-10 years; 5) irreparable

Cost: \$900 (not including
travel, per diem & lodging)



APPENDIX 3.

Monument Treatment Proposal

Section:

Plot: 8

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☐ die on base ☐ tab in socket ☐ box ☒ other: urn

Position: ☒ fallen ☐ tilted ☐ unstable ☒ unattached/loose ☐ missing

Existing Condition

Deterioration: ☐ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☒ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☐ partial 25-50% ☐ minimal <25% ☒ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☒ biological ☐ staining ☐ efflorescence ☐ other:

Treatment Strategy

Position: ☒ reset/level in ground ☐ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☒ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

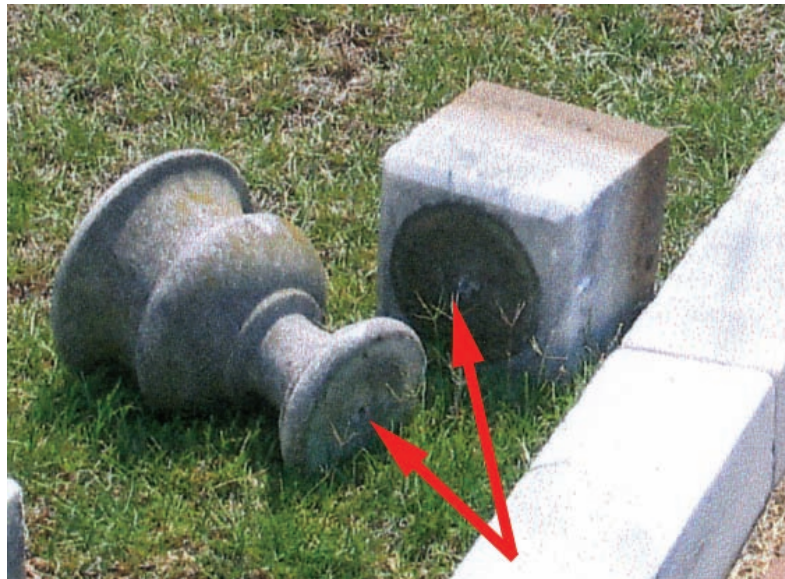
Treatment: ☒ core drill ☒ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☐ other:

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 3

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in
5-10 years; 5) irreparable

Cost: **\$350**(not including
travel, per diem & lodging)



Monument Treatment Proposal

Section:

Plot: 9

Name: Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☐ die on base ☐ tab in socket ☐ box ☒ other: ledger

Existing Condition

Position: ☒ fallen ☐ tilted ☐ unstable ☐ unattached/loose ☐ missing

Deterioration: ☒ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☒ partial 25-50% ☐ minimal <25% ☐ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☒ biological ☐ staining ☐ efflorescence ☒ other: atmospheric staining

Treatment Strategy

Position: ☐ reset/level in ground ☒ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☐ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

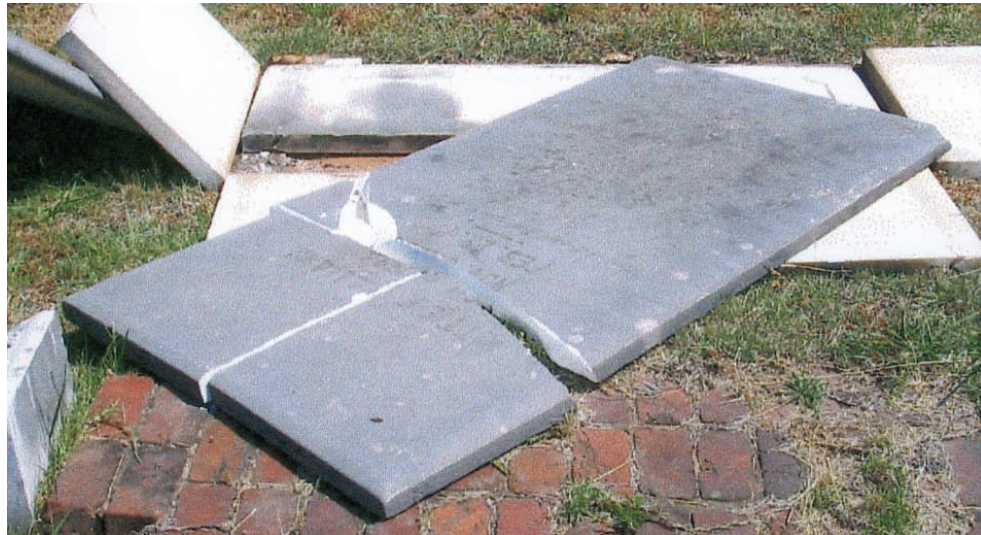
Treatment: ☐ core drill ☒ drill and pin ☐ simple adhesive repair ☒ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☒ other: additional support may be necessary; infill with Jahn M120

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 2

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: \$1,800(not including travel, per diem & lodging)



Monument Treatment Proposal

Section:

Plot: 10

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☐ die on base ☐ tab in socket ☐ box ☒ other: urn

Position: ☒ fallen ☐ tilted ☐ unstable ☒ unattached/loose ☐ missing

Existing Condition

Deterioration: ☐ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☒ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☐ partial 25-50% ☐ minimal <25% ☒ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☒ biological ☐ staining ☐ efflorescence ☐ other:

Treatment Strategy

Position: ☒ reset/level in ground ☐ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☐ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

Treatment: ☒ core drill ☒ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☐ other:

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 1

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: \$750 (not including travel, per diem & lodging)



Monument Treatment Proposal

Section:

Plot: 11

Name: Material: ☐ marble ☒ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☒ die on base ☐ tab in socket ☐ box ☐ other:

Existing Condition

Position: ☒ fallen ☐ tilted ☐ unstable ☐ unattached/loose ☐ missing

Deterioration: ☐ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☐ partial 25-50% ☐ minimal <25% ☒ not applicable

Failed/Old Treatments: ☐ metal ☒ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☐ biological ☐ staining ☐ efflorescence ☐ other:

Treatment Strategy

Position: ☐ reset/level in ground ☒ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☐ reset with 0:1:3 mix ☒ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

Treatment: ☐ core drill ☐ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☐ other:

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 2

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: \$250(not including travel, per diem & lodging)



APPENDIX 3.

Monument Treatment Proposal

Section:

Plot: 12

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☐ die on base ☐ tab in socket ☐ box ☒ other: foot of cradle

Existing Condition

Position: ☐ fallen ☐ tilted ☐ unstable ☒ unattached/loose ☐ missing

Deterioration: ☐ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☐ partial 25-50% ☐ minimal <25% ☒ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☐ biological ☒ staining ☐ efflorescence ☐ other:

Treatment Strategy

Position: ☒ reset/level in ground ☐ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☐ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

Treatment: ☐ core drill ☐ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☒ other: need to identify original location

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 2

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: \$150(not including travel, per diem & lodging)



Monument Treatment Proposal

Section:

Plot: 13

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☐ die on base ☐ tab in socket ☐ box ☒ other: pedestal tomb

Existing Condition

Position: ☒ fallen ☐ tilted ☐ unstable ☐ unattached/loose ☐ missing

Deterioration: ☐ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☐ partial 25-50% ☒ minimal <25% ☐ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☒ biological ☐ staining ☐ efflorescence ☐ other:

Treatment Strategy

Position: ☐ reset/level in ground ☒ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☒ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

Treatment: ☐ core drill ☒ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☐ other:

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 2

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: \$1,050(not including travel, per diem & lodging)



APPENDIX 3.

Monument Treatment Proposal

Section:

Plot: 14

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☐ die on base ☐ tab in socket ☐ box ☒ other: obelisk

Existing Condition

Position: ☒ fallen ☐ tilted ☐ unstable ☐ unattached/loose ☐ missing

Deterioration: ☒ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☒ partial 25-50% ☐ minimal <25% ☐ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☒ biological ☐ staining ☐ efflorescence ☐ other:

Treatment Strategy

Position: ☐ reset/level in ground ☒ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☒ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

Treatment: ☐ core drill ☒ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☐ other: infill with Jahn M120

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 2

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: \$2,200(not including travel, per diem & lodging)



CHRIST CHURCH CEMETERY, GREENVILLE, S.C.

Monument Treatment Proposal

Section:

Plot: 15

Name: Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☐ die on base ☐ tab in socket ☐ box ☒ other: obelisk

Position: ☐ fallen ☐ tilted ☒ unstable ☒ unattached/loose ☐ missing

Existing Condition

Deterioration: ☐ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☐ partial 25-50% ☐ minimal <25% ☒ not applicable

Failed/Old Treatments: ☐ metal ☒ adhesives/coatings ☐ mortar ☒ other: inappropriate and dangerous repair using setting compound - presents significant liability to church

Soiling: ☒ biological ☐ staining ☐ efflorescence ☐ other:

Treatment Strategy

Position: ☒ reset/level in ground ☐ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☒ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☒ hand tools ☐ solvents ☐ other:

Treatment: ☐ core drill ☒ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☐ other:

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 1

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: \$950 (not including travel, per diem & lodging)



Monument Treatment Proposal

Section:

Plot: 16

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☒ die on base ☐ tab in socket ☐ box ☐ other:

Position: ☒ fallen ☐ tilted ☐ unstable ☐ unattached/loose ☐ missing

Existing Condition

Deterioration: ☐ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☐ partial 25-50% ☒ minimal <25% ☐ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☒ mortar ☐ other:

Soiling: ☒ biological ☐ staining ☐ efflorescence ☐ other:

Treatment Strategy

Position: ☐ reset/level in ground ☒ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☒ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

Treatment: ☐ core drill ☒ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☐ other:

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 2

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: \$800 (not including travel, per diem & lodging)



Monument Treatment Proposal

Section:

Plot: 17

Name:

Material: ☐ marble ☒ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☒ die on base ☐ tab in socket ☐ box ☐ other:

Position: ☒ fallen ☐ tilted ☐ unstable ☐ unattached/loose ☐ missing

Existing Condition

Deterioration: ☐ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☒ partial 25-50% ☐ minimal <25% ☐ not applicable

Failed/Old Treatments: ☐ metal ☒ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☒ biological ☐ staining ☐ efflorescence ☐ other:

Treatment Strategy

Position: ☐ reset/level in ground ☒ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☐ reset with 0:1:3 mix ☒ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

Treatment: ☐ core drill ☒ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☐ other:

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 1

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: \$1,450(not including travel, per diem & lodging)



APPENDIX 3.

Monument Treatment Proposal

Section:

Plot: 18

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☐ die on base ☐ tab in socket ☐ box ☒ other: obelisk

Existing Condition

Position: ☒ fallen ☒ tilted ☐ unstable ☐ unattached/loose ☐ missing

Deterioration: ☒ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☒ partial 25-50% ☐ minimal <25% ☐ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☒ biological ☐ staining ☐ efflorescence ☒ other: atmospheric staining

Treatment Strategy

Position: ☒ reset/level in ground ☐ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☒ stabilize foundation ☒ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

Treatment: ☐ core drill ☒ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☒ other: refill losses with Jahn M120

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 2

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: \$975 (not including travel, per diem & lodging)



Monument Treatment Proposal

Section:

Plot:

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☒ headstone ☐ footstone ☐ die on base ☐ tab in socket ☐ box ☐ other:

Position: ☒ fallen ☐ tilted ☐ unstable ☐ unattached/loose ☐ missing

Existing Condition

Deterioration: ☒ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☒ partial 25-50% ☐ minimal <25% ☐ not applicable

Failed/Old Treatments: ☐ metal ☐ adhesives/coatings ☐ mortar ☐ other:

Soiling: ☒ biological ☐ staining ☐ efflorescence ☐ other:

Treatment Strategy

Position: ☒ reset/level in ground ☐ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☐ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☐ hand tools ☐ solvents ☐ other:

Treatment: ☐ core drill ☒ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☒ other: infill losses with Jahn M120

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: 2

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
 3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: **\$850** (not including travel, per diem, & lodging)



APPENDIX 3.

Monument Treatment Proposal

Section:

Plot:

Name:

Material: ☒ marble ☐ granite ☐ brick ☐ other:

Type: ☐ headstone ☐ footstone ☒ die on base ☐ tab in socket ☐ box ☐ other:

Position: ☐ fallen ☐ tilted ☒ unstable ☒ unattached/loose ☐ missing

Existing Condition

Deterioration: ☐ broken ☐ cracked ☐ losses ☐ flaking/sugaring ☐ ferrous pins ☐ brass pins
☐ delamination/detachment ☐ spalling ☐ missing fragments ☐ other:

Extent: ☐ extensive >50% ☐ partial 25-50% ☐ minimal <25% ☒ not applicable

Failed/Old Treatments: ☐ metal ☒ adhesives/coatings ☐ mortar ☒ other: inappropriate and dangerous repair using setting compound - presents significant liability to church

Soiling: ☐ biological ☐ staining ☐ efflorescence ☒ other: very light atmospheric staining

Treatment Strategy

Position: ☐ reset/level in ground ☒ reset/level to existing base ☐ construct new base ☐ resquare
☐ possible new base required ☐ stabilize foundation ☒ reset with 0:1:3 mix ☐ reset with compound

Failed Treatments: ☐ drill/grind ☒ hand tools ☐ solvents ☐ other:

Treatment: ☐ core drill ☒ drill and pin ☐ simple adhesive repair ☐ injection grout ☐ replace bricks
☐ mortar ☐ repoint ☐ other:

Cleaning: ☐ low pressure water ☒ D/2 and flush ☐ poultice ☐ other:

Priority: **1**

1) hazardous, immediate action; 2) unstable, requires treatment ASAP;
3) ongoing deterioration, treatment required 2-3 years; 4) re-inspect in 5-10 years; 5) irreparable

Cost: **\$850** (not including travel, per diem & lodging)



CHRIST CHURCH CEMETERY, GREENVILLE, S.C.

Cemetery Preservation Plans

Historical Research

**Identification of Grave Locations
and Mapping**

Condition Assessments

Treatment of Stone and Ironwork



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